An Address

ON

SOME POINTS CONCERNING TUBERCLE, SYPHILIS AND MALIGNANT DISEASE.*

BY

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GENTLEMEN,—I highly appreciate the honour of being asked to address you, and have selected for my subject three of the most common and most interesting of surgical diseases—tubercle, syphilis, and malignant disease. It has been helpful to me, and I trust it may be to you, to consider them together.

For two of them—syphilis and tubercle—the responsible organism has been discovered. It is still being searched for in respect to cancer and sarcoma.

All of these diseases commence locally, and spread mainly by the lymphatics. The primary lesion in each may either take the form of an ulcer or that of a tumour. Thus, in cancer of the tongue, ulcer is common while tumour is rare; in the breast, ulcer is rare (Paget's disease), while tumour is common.

In tubercle, the primary lesion is frequently so trifling as to pass unobserved.

In syphilis, it may be so insignificant as to attract no attention.

In malignant disease, it is usually a most important feature.

In each, many of the conditions described as characteristic of the disease are the result of septic infection of the primary focus. This may be a serious complication in all of them.

The skin and genito-urinary organs are the favourite sites in all. Syphilis remains localized for so short a time that the generalized manifestations of it have rarely, if ever, been prevented by the earliest excision of the primary lesion. In malignant disease early excision of the primary lesion alone offers a chance. In tubercle it does not often fail.

The importance of the primary focus in all these diseases is not yet sufficiently recognized. If the primary focus in cancer is removed, secondary growths will, in a certain percentage of cases, disappear. This has occurred in chorion-epithelioma, when, after hysterectomy, a secondary growth in the lung gave no further trouble. It is also proved by the results of old-fashioned operations for cancer, in which only the primary growth was excised, for it is now accepted knowledge that, in the great majority of these cases, the nearest lymphatic glands are early infected.

GLANDS.

All of them infect and cause enlargement of the lymphatic glands. These seem to offer little or no resistance to the diffusion of syphilis, considerable resistance to the dissemination of tubercle, and for a long time they stop the advance of malignant disease.

Therefore, syphilis is always disseminated, tubercle frequently, malignant disease rarely.

Syphilis confers complete immunity, tubercle partial immunity, malignant disease probably no immunity at all.

The glandular enlargement in syphilis is general, in tubercle limited, and in malignant disease localized. Following syphilitic infection, all the local glands swell and feel like almonds. Shortly after all the glands in the body participate. Syphilitic glands never suppurate. Following tuberculous infection the local lymphatic glands swell one at a time, feel like a string of small potatoes, tend to form large tumours, and frequently suppurate. Following cancerous infection, the local glands enlarge (those nearest the point of infection first), they grow into hard fixed tumours, and seldom suppurate except in the neck.

Dissemination always occurs before three months in syphilis, and on the skin it appears usually as a roseolous eruption. The dissemination of tubercle is rare, and occurs chiefly in the viscera of the head, chest, and abdomen. General dissemination of cancer is rarer still. When it occurs in the skin all over the body the eruption, on superficial examination, may be mistaken for that of syphilis. On the other hand, dissemination of sarcoma is to be expected, and when it attacks the lungs and pleura the symptoms and signs of tuberculous disease are closely simulated.

ULCERS.

It is generally possible to offer a correct diagnosis as to whether an ulcer is due to tubercle, or to cancer, or to syphilis. The age, appearance, and sex of the patient, the history of how the condition commenced, and its site are of an importance next to the physical signs.

Tubercle is most common in the young, syphilis in the middle-aged, and cancer in the old.

Tuberculous subjects look thin and anaemic or fat and pasty (delicate); the syphilitic look "dry," with a muddy anaemia, and the cancerous florid and robust.

Tubercle and cancer affect both sexes equally, syphilis mainly the male.

A tuberculous ulcer usually commences as a small sore, which has gradually destroyed its site (destruction in excess of growth); the cancerous ulcer, as an irritable crack around which a tumour has developed (growth in excess of destruction); the syphilitic ulcer, as a tumour which has broken down (an ulcerating tumour).

Tubercle and cancer choose sites furnished with the best vascular supply, syphilis with the worst.

Mistakes will become less frequent with improved diagnosis, but are sometimes, as yet, unavoidable.

I have excised an ulcer of the lower lip, and along with it the enlarged submaxillary and submental glands, of an elderly man, for "epithelioma." Microscopical examination of the growth and of the glands proved tubercle.

I excised the tongue of a stout, florid man, between 50 and 60, for an "epithelioma," which proved to be tubercle. He was quite well ten years later.

I excised the uterus of a patient for "carcinoma of the cervix." This was also a case of tuberculous disease.

To the infirmary clinics, chancres of the lip or tongue are usually sent as "epitheliomata." I treated one girl of 26 and a man of 28 with mercury and iodide, for a "chancre of the lip." They both died of cancer of the lip and neck respectively within one year.

I have observed cases of "cancer of the cervix uteri" cured by a course of iodide and mercury. They were syphilitic sores, and either had, or developed later, signs typical of syphilis.

A large number of "cancers" of the face have been cured by mercury and iodide; and as large a number of cancers of the tongue and of the penis have had their chance of cure lost through delay in operating whilst the same means were being "fairly tried."

TUMOURS.

The chronic inflammatory swellings produced by tubercle and syphilis have not infrequently been mistaken for malignant disease, and vice versa.

Many bowel "tumours," due to tubercle, especially at the caecum, have been excised under the belief that they were malignant.

I operated on a case of "cancer of the pylorus," and found the disease too far advanced for anything but the palliative operation of gastro-enterostomy. To confirm the diagnosis I removed a gland. It only contained tubercle. The microscopical diagnosis was confirmed by the permanent recovery of the patient and the disappearance of the tumour.

A middle-aged woman had "cancer of the liver and ascites, with hard lumps in the omentum, and jaundice." Examination revealed typical tertiary syphilitic ulceration over the left shoulder. Mercury and iodide cured her.

A man, aged 38, had three attacks of acute intestinal obstruction in eighteen months. After the last of these I opened his abdomen, and found a "fixed inoperable malignant growth" in his sigmoid flexure. His doctor, who was present at the operation, mentioned that he had treated him for syphilis seven years before. Since a mercurial course he has had no further attack, and fifteen

* Delivered before the Blyth Division of the British Medical Association on September 25th, 1910.

years after is well. Fortunately I refrained from making a permanent colostomy opening, because I thought it would be soon enough for that when the obstruction recurred.

A middle-aged man had an "aneurysm of the thoracic aorta eroding his sternum." The "aneurysm" disappeared after six weeks of mercury and iodide.

I excised a large thyroid for "malignant growth" from a woman of middle age. The microscope revealed tubercle.

In another case I made a diagnosis of a malignant thyroid and offered a hopeless prognosis. Six months afterwards an abscess opened and the pus was tuberculous. The patient was alive three years later.

A stout, healthy-looking lady was operated upon by one of my colleagues at my request for a "typical scirrhus of the breast." A macroscopic section confirmed the diagnosis. The pathologist and ourselves required more than one series of microscopic sections to satisfy us that we were all wrong. The "tumour" was tubercle.

A "tumour" of a bone may be due to either.

I once saw a leg amputated at the hip-joint for "sarcoma" at the lower end of the femur. This was a syphilitic gumma.

A patient had his leg amputated at the upper part of the thigh for a "sarcoma" of the lower end. Sixteen months later a "secondary growth" appeared in the upper end of the humerus of the opposite side. This was cured with iodide and mercury, and the patient is alive and well fifteen years later.

A patient was advised amputation at the hip for a "sarcoma" of the upper end of the femur. The advice was not accepted. Twelve months later a tuberculous abscess was opened, and recovery followed.

A patient was operated on for "tubercle" of the upper end of the humerus. Profuse haemorrhage followed the incision, and a fungating malignant growth appeared through it a few days later.

Even a skilled pathologist with his microscope may make mistakes.

A man of 35 had his right testicle removed for a "round-celled sarcoma." Nine months later he "developed a secondary growth in his brain." This serious brain lesion disappeared after a course of mercury and iodide.

Nearly twenty years later he is well.

I was once asked to look down a microscope and offer a diagnosis. I felt no doubt that the section of skin revealed bore a typical epithelioma. It was a nodule of leprosy, and a favourite "catch."

A young married man had his left testicle excised for "tubercle." The diagnosis was confirmed by the microscope (no tubercle bacilli were found). One year later his right testicle swelled as the other had done, and he resented the proposal that it also should be removed. Mercury and iodide quickly cured him.

HODGKIN'S DISEASE (LYMPHADENOMA).

This condition, as yet ill understood, sometimes resembles tubercle, sometimes sarcoma, in its clinical course. The enlarged glands, which are characteristic of it, may remain for long unchanged, then slowly soften, redden on the surface, break down, discharge a curdy matter, and finally heal. The patient with this form of the disease may live for several years. In the second type the glands become glued together and fixed; internal growths develop quickly, and the patient dies, with dissemination throughout the viscera.

FIBROSIS.

Natural cure occurs in all of these diseases. It is the rule in syphilis, the exception in tubercle, and very rare in cancer. In all of them the cure of the local lesions is the result of fibrosis.

The tendency to break down is characteristic of the acute type of tubercle, syphilis, and malignant disease; and to fibrose is characteristic of the chronic variety.

The natural tendency of fibrous tissue to contraction accounts for the fact that stricture of the tubular viscera may be the result of tubercle, of syphilis, or of cancer.

In all, the newly developed fibrous tissue may grow so luxuriantly as to form a tumour, chiefly fibromatous. Keloid of the skin, and many internal growths, are of this nature, and in each of them the chief clinical characteristics are slow development and long duration, with periods of quiescence (fibrosis or sclerosis in excess) and exacerbation (infection in excess).

In the prognosis of cases of cancer everything depends upon the amount of existing fibrosis. The ill-defined diffuse growths, so active as to simulate inflammatory swellings, offer the worst prognosis. The firmer, more defined growths, resembling simple tumours in their physical characteristics, are the most favourable in prognosis.

A growth rich in cells and without much fibrous tissue will rapidly disseminate and kill.

I have known a patient die of breast cancer within three months of its appearance. On the other hand, one patient under my care lived for twenty-five years after two operations for breast cancer, both of which failed to remove the growth and were followed by an inoperable recurrence. Death resulted from extension of the cancer to the pleura and lung. From time to time I had the opportunity of watching the great fight between cancer and fibrosis, and though complete healing never occurred the supremacy of the external fibrous tissue was maintained till the end. This was at the expense of much discomfort to the patient, for the right side of her chest was tightly bound and contracted by thick, large patches of scar tissue.

Many cases of atrophic scirrhus cancer of the breast have lived for years without much discomfort, and have frequently in the end died through bone infection. They owe their benign course to fibrous tissue formation. Some of them assume a more malignant course after operation, and in view of what has been said the explanation is obvious.

Cancer of the colon may be one of the most malignant or one of the most benign of malignant growths.

If it takes the form of a tumourating ulcer without stricture its course is malignant; if, on the other hand, stricture (that is, fibrosis) is the predominating feature a better prognosis can be offered.

Tuberculous glandular tumours of long standing are chiefly composed of fibrous tissue.

A patient of mine carried about a testicle the size of a cocoanut for twenty years, before it troubled him sufficiently to require removal. It was syphilitic, but consisted chiefly of fibrous tissue.

BONES.

For bone sarcomata the rule corresponds exactly with that discussed above. Their malignancy may be gauged by the amount of osseous tissue in relation to them.

The least malignant (myelomata) have an even, rounded shape, and may not destroy life for many years. They are enveloped in a well-defined bony capsule, which may expand indefinitely with their growth. If they burst through this capsule they infiltrate the surrounding tissues, grow rapidly, and declare their malignancy.

The most malignant of malignant tumours are the so-called periosteal sarcomata of growing bones. They spring from the bone, and their favourite site is in the neighbourhood of the most active epiphyses (upper end of humerus, lower end of radius, lower end of femur, upper end of tibia). Their growth is so rapid that they assume an irregular lobulated form, and any resistant structure met with, such as tendon, blood vessel, or nerve, leaves its mark on their surface, because, in their hurry to get big, they follow the path of least resistance. Their victims die within the year, usually from growths in the lung, and whether the most radical operation is or is not done.

In the intermediate group of bone sarcomata—those of neither very slow nor very rapid growth—the degree of malignancy may be estimated by the amount and density (shown by *x* rays) of the osseous tissue connected with them. Some of them, after years of slow growth, suddenly develop their malignant tendency, owing to the fact that the tumour cells have overpowered their osseous inhibitor.

Like the pyogenic infections, those of tubercle, cancer, and syphilis can be imprisoned by fibrous tissue and bony deposits for long periods of time.

SEPTIC INFECTION.

The evil influence of septic infection on tubercle, malignant disease and syphilis is insufficiently recognized. Each may have a relatively benign course till sepsis is superadded. An uncomplicated tuberculous abscess never

causes constitutional disturbance or death, but when septic infection has gained an entrance to it both frequently follow.

The uncomplicated primary "sore" of syphilis is not a sore at all, but a hard, dry, raised, painless lump.

Most of the pain, the odour, and the discharge of cancer are due to superadded sepsis. One of the conditions in which they are all pronounced is cancer of the uterine cervix. I have had opportunities for observing elderly spinsters with this disease. In all, the only early symptom was haemorrhage. Before the growth had caused serious disturbance it had in each instance invaded the bladder, was infiltrating the surrounding structures, and had become inoperable.

Chronic Lymphatic Oedema.

Amongst other causes of chronic lymphatic oedema of the extremities tubercle, syphilis, and cancer have to be remembered.

Combinations.

That of syphilis and tubercle is a deadly combination. I have seen cases in which tubercle attacked the lungs of a victim of secondary syphilis. In each instance the tubercle rapidly advanced to a fatal issue.

The most disastrous form of "scrofula" is a combination of congenital syphilis and tubercle.

Cancer and syphilis are very firm allies, and syphilis often provides a suitable site for the lodgement of cancer. If a person over 60 years of age contracts syphilis his death from cancer may be anticipated.

Tubercle and cancer favour the same sort of soil. Persons who have recovered from tubercle in their youth are exceptionally liable to cancer in their later years. It is more than a coincidence that both occur in families with a history of some members having attained to an extraordinarily long life.

THE ROENTGEN RAY APPEARANCES OF THORACIC ANEURYSM.*

By A. C. JORDAN, B.A., M.D.Cantab.,

MEDICAL RADIOGRAPHER, GUY'S HOSPITAL, AND ROYAL HOSPITAL FOR DISEASES OF THE CHEST.

Thoracic aneurysm is a condition in which a Roentgen-ray examination is of the greatest value, for there are few cases in which such an examination does not clear up the diagnosis beyond possibility of doubt. In the normal thorax, viewed from the front or back, the normal aortic arch is usually entirely concealed by the shadow of the vertebral column. In a fair proportion of normal cases, however, it forms a slight bulge to the left of the vertebral column below the clavicle. Thus, we must not fall into the error of taking a mere bulge to the left of the spine above the cardiac shadow as evidence of the presence of an aneurysm. It is necessary to supplement the view obtained in this plane by a view in the plane of the aortic arch itself. For this purpose the patient is placed vertically on a revolving seat in such a manner that he can be revolved upon his vertical axis between the *x*-ray tube and the fluorescent screen.

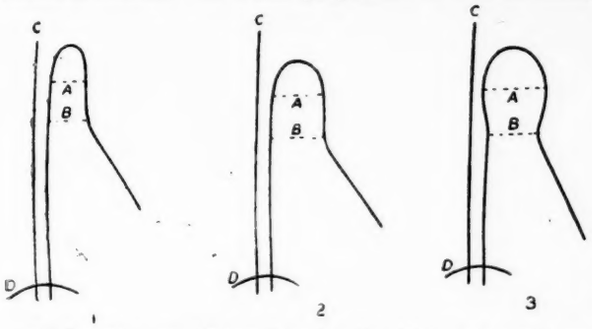

Fig. 1.—Diagrams of the aortic arch in the right anterior oblique view. 1, Normal arch. 2, Generally dilated arch. 3, Fusiform arch. C, Front of vertebral column. D, Diaphragm. Immediately in front of C is the posterior mediastinal clear space.

It will be remembered that the direction of the course of the aortic arch from its origin is backwards and to the left. Hence we are able to obtain a view in the actual plane of the aortic arch by revolving the patient so as to bring the right shoulder forward. The exact angle to which he should be revolved in individual cases is determined by the appearance on the fluorescent screen. In this, the right anterior oblique view, the appearance of the normal aortic arch and of the aneurysmal arch is illustrated by the diagram (Fig. 1), which shows the appearance of the aortic arch in relation to the posterior mediastinum and to the vertebral column.

In both the normal and the generally dilated arch the sides of the aortic shadow are parallel, a line A drawn horizontally across the upper part of the shadow being equal in length to a horizontal line B across the base, where the aortic shadow and the shadow of the auricle meet. In the generally dilated arch, however, both A and B are greater in length than in the normal arch, and it is not uncommon to find them double the length of the normal arch. In the fusiform arch the upper line A is longer than the line B at the base of the arch. A saccular aneurysm is merely an exaggeration of the fusiform arch.

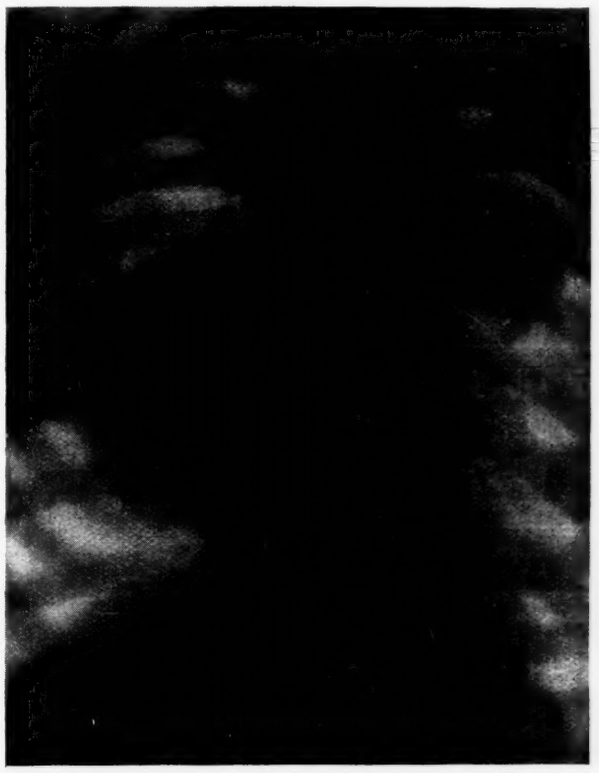

Fig. 2.—Large saccular aneurysm of the ascending portion of the aortic arch. The transverse portion of the arch is displaced to the left.

The only form of aneurysm which is not revealed with certainty by either the anterior or the oblique examination is a small aneurysm confined to the concavity of the arch. I have no personal experience of this form except in association with general dilatation of the arch. If the symptoms, for example, those of pressure upon the recurrent laryngeal nerve, are too great in any particular case to be explained by moderate general dilatation of the arch, the fact should be borne in mind that there may be a localized saccular aneurysm in the concavity of the arch. In the case of a large saccular aneurysm of the aortic arch there can rarely be any doubt from the anterior view alone as to the diagnosis. When the saccular aneurysm affects the ascending portion of the arch, the transverse arch is usually displaced to the left by the pressure of the aneurysm, and is seen to the left of the vertebral column (Fig. 2).

In an aneurysm which involves the whole of the aortic arch it is usual to find the long axis of the heart far more oblique than usual. In explanation of this it should be remembered that a generally dilated arch is also elongated

* A paper read in the Section of Medicine at the annual meeting of the British Medical Association, 1910.

Since the descending thoracic aorta is fixed in position against the vertebral column, it is the aortic arch, lying free in the thorax, whose position will alter. Consequently, as the arch elongates, the commencement of the arch will take up a lower position in the chest, so much lower that in some cases the heart appears to be actually lying upon its right side with its long axis practically horizontal.

Fig. 3.—Aneurysm of the innominate artery above a dilated aortic arch.

In less extreme cases, where the aortic arch shadow as seen from the front is decidedly greater than normal, the oblique view will show the exact nature and degree of the dilatation, and aortic arches which look very much alike from the front will be seen to be due in some cases to moderate general dilatation, in others to great general dilatation, and in others, again, to fusiform dilatation of the arch.

Aneurysm of the innominate artery usually forms a very striking and characteristic picture. In most cases the arch itself is dilated, sometimes considerably so. From the upper part of the shadow of the arch, just to the right of the spine, a considerable shadow ascends and is lost in the dense tissues of the neck (Fig. 3).

An unusual case is that of an aneurysm of the descending thoracic aorta, displacing the heart and aortic arch forward (Fig. 4). In the right anterior oblique view the outline of the heart and aortic arch are shown to be normal, but their distance from the vertebral column is increased. The posterior mediastinal clear space is occupied in its middle part by an opaque shadow, which was thought during life to be due to a mass of enlarged glands, but was shown at the *post-mortem* examination to be due to an aneurysm of the descending thoracic aorta. This aneurysm pressed upon the oesophagus and gave rise to difficulty in swallowing. A bismuth emulsion was found, when swallowed, to be obstructed at the level of the upper part of the aneurysm, the emulsion collected above it, while a thin stream found its way through the oesophagus around the aneurysm.

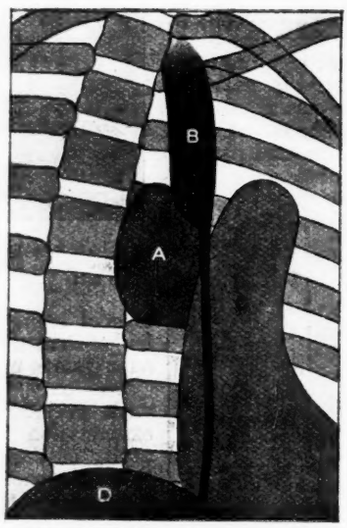

Fig. 4.—Right anterior oblique view. A, Saccular aneurysm of descending thoracic aorta. B, Bismuth emulsion in the oesophagus above the aneurysm; a thin stream of the emulsion is seen passing thence down to the diaphragm, whence it enters the stomach. C, Aortic arch, normal in size, displaced forward by the pressure of the aneurysm. D, Diaphragm.

In complicated cases the diagnosis may be far less easy.

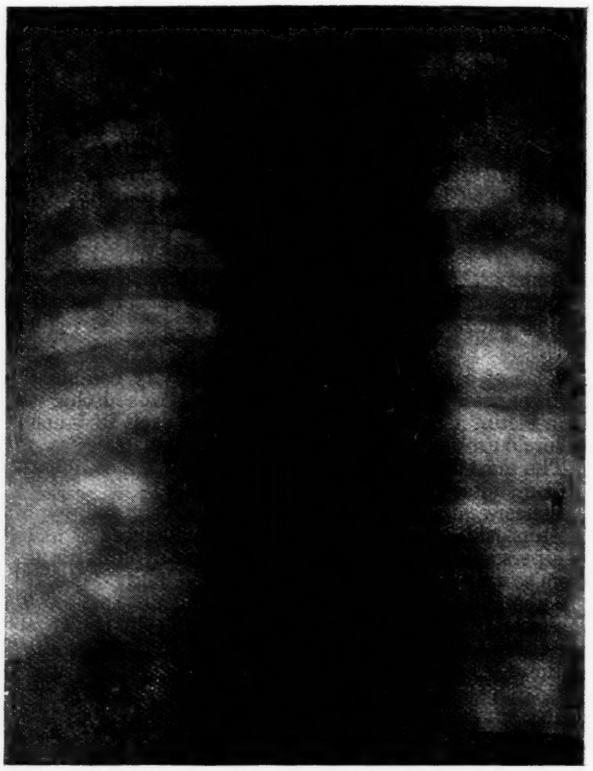

Fig. 5.—Aneurysmal dilatation of the descending thoracic aorta in its entire length.

Thus, in the presence of a large pleuritic effusion, where the lung above the effusion is compressed and the other lung is considerably congested, the outlines of the cardiac and aortic shadow are so far concealed that a diagnosis may be almost impossible, although, after the removal or the absorption of the pleuritic fluid, the diagnosis becomes obvious.

It is somewhat surprising to find how frequently an error in diagnosis may occur in cases in which the Roentgen-ray examination reveals the diagnosis at a glance. Thus phthisis is not infrequently diagnosed as aortic aneurysm, while an aortic aneurysm is still more often mistaken for pulmonary phthisis. New growth in the chest may give rise to areas of percussion dullness and to other signs and symptoms suggestive of aneurysm, while various swellings may, by receiving transmitted pulsation from the heart or aorta, simulate an aortic aneurysm very closely.

In other cases an examination of the aortic arch throws light on the nature of a case where the actual complaint is not connected with the thoracic aorta. Thus in a case of pulsating abdominal tumour examined recently, in which the diagnosis of aneurysm of the abdominal aorta had been made, although there was some possibility that the tumour was connected with the liver, it was shown that the aortic arch was dilated, while the descending thoracic aorta was uniformly dilated in its entire length. (Fig. 5.) Thus it may be said that the diagnosis of abdominal aneurysm was placed beyond a doubt, while, further, the utility of surgical treatment for it, in view of the condition of the thoracic aorta, was made clear.

Dilatation of the aortic arch usually follows atheromatous disease of the endothelium, and the question arises whether it be possible, by a Roentgen-ray examination, to determine the presence of atheroma while there is as yet no dilatation of the aortic arch. One is bound to admit that atheromatous patches as such are not recognizable either on the fluorescent screen or on a photographic plate, although calcareous patches have occasionally been shown when they happen to have been caught edgeways, but even this is of extremely rare occurrence.

There is one fact, however, which has considerable bearing on this question of atheroma, and that concerns the form of the cardiac and aortic shadows. We have shown that a generally dilated arch is elongated, and throws the heart into a more oblique position than is seen normally. When aortic regurgitation is present the form of the heart is characteristic, the apex being displaced to

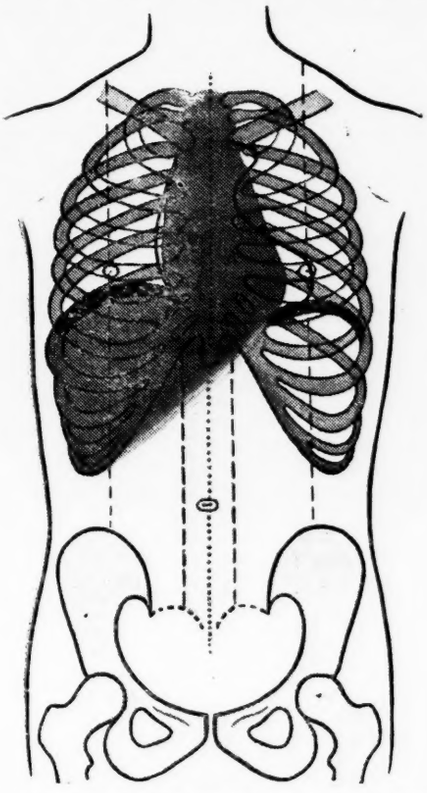

Fig. 6.—Author's diagram showing the normal cardiac area (shaded) and the form of cardiac and aortic shadow commonly associated with aortic regurgitation due to atheroma of the aorta (curved black outline).

the left, while the left ventricle and the left auricle are both comparatively empty. In this way an excavated appearance of the left cardiac border obtains when viewed from the front, and this is accentuated by the prominence of the aortic arch to the left of the spine. Even before the aortic arch has begun to dilate this particular form of cardiac shadow is found, so that in any case in which the presence of an atheromatous aorta is suspected the discovery of this particular form of cardiac shadow affords valuable circumstantial evidence confirming the suspicion of atheroma (Fig. 6).

THE late Dr. Jameson John Macan, brother of the Master of University College, Oxford, left estate of the gross value of £7,628, with net personalty of £7,541.

ACCORDING to the *New York State Journal of Medicine*, the average annual income of the medical profession in the United States is 1,250 dollars (£250).

IT has been arranged that a special congress on the standard of purity in cocoa and chocolate will take place in Paris in January, 1911, when there will be present delegates from Germany, England, Austria Hungary, Belgium, Brazil, Spain, the United States, France, Holland, Italy, Mexico, and Switzerland. The congress is being arranged under the auspices of the White Cross Society of Geneva, whose delegate in the United Kingdom is Mr. Loudon M. Douglas, F.R.S.E., of 3, Lauder Road, Edinburgh.

MINER'S NYSTAGMUS.*

By H. S. ELWORTHY, F.R.C.S.,

INSPECTOR OF INJURED WORKMEN TO THE EBBW VALE COMPANY.

IN compliance with the request of one of your secretaries, who has done me the honour of asking me to read a paper before you, I propose to bring to your notice some observations on miner's nystagmus.

While engaged in examining injured workmen for the Ebbw Vale Company during the past three years a certain number of cases have been examined; but I must ask your indulgence if the observations are not very elaborate, owing to the limited time in which they have to be made, and also if the conclusions I have drawn from them may seem presumptuous or premature, considering the small number of cases and the short period of time in which I have been engaged in the work.

To begin with, miner's nystagmus is a disease peculiar to coal miners. I have made inquiries as to its occurrence in the Cornish tin mines, but have not heard of any cases. Nystagmus is not mentioned in the Blue Book on the Health of Cornish Miners, 1904. Inquiries as to its prevalence in the lead mines of the Isle of Man were also negative. For this information I am indebted to Drs. T. A. Woods of Douglas, and H. Gell of Peel.

ETIOLOGY.

On considering the question, "Why is it that nystagmus only occurs in coal mines?"—I come to the conclusion that it is the absence of colour that makes all the difference.

I take it that the cause is fatigue of the eye, resulting from working by artificial light with a black background and nearly black surroundings. There is the blackish "rubbish" or "slack" above and below the coal, and the jet-black coal with some sparkling facets which reflect the light. The monotony is not relieved by other colours. The miner may come to work with clean face and clothes, but in a few hours all is more or less black from the dust. Then he has to fix with his eye the point at which to strike with his mandril, or to lift out lumps of coal against a black background. When he turns his eyes away from the coal there is no colour relief. To make matters worse, the majority of miners prefer to work in the day. The consequence is that for the greater part of the year it is dark when they get up and go to work; they work in the dark, and in winter it is dark soon after they come out. They therefore get the minimum of daylight, and the opportunity of seeing a variety of colours by daylight, which means physiological relief to the eye.

Another cause of fatigue to the eye is when miners have to walk a mile or more underground to reach the "face" where they work. They proceed more or less in single file, each carrying a lamp which gives out light in every direction. The result is that the miner walking behind another gets the glare of that lamp in his eyes all the time. Consider what that means in a two or four mile walk.

Then, after working his eight hours and his eyes being more or less exhausted, he has to make a similar journey back. On inquiry I have generally found that men feel the effects of nystagmus most when they come from work with the abominable glare of the lamp just in front of them. Many have to sit down and wait until it has gone out of the way.

As to the theory that nystagmus is produced by working while lying down I can give no opinion, as the great majority of the Ebbw Vale colliers, I am told, work in the upright position; and I have not yet seen a case of oblique nystagmus. And, besides, other underground workers get nystagmus, such as hauliers, timbermen, and repairers in coal mines. The only class of workers in coal mines that seem immune is the ostlers, and that is because the stables are whitewashed. That it is not due to imperfect fusion is shown by its occurrence in one-eyed men.

The one essential factor seems to be exhaustion of the eyes from working in the general blackness without any colour relief.

* Read before the Monmouthshire Division of the British Medical Association.

PATHOLOGY.

I know nothing about the minute changes in the retina or nerve centres of the orbital muscles. What seems to me to occur is, when a certain stage of exhaustion is arrived at, co-ordination is lost and spasm sets in; very much the same as in writer's cramp or other trade neuroses. Lastly, accommodation fails. The spasms are clonic, and may be regular or irregular, and confined to two opposing muscles or affecting more. In some cases the whole head is in a state of tremor. In the early or "latent" stage, although there are movements of the eyes, there is sufficient power of accommodation to prevent confusion of vision, but sooner or later this accommodation fails.

SYMPTOMS AND COURSE OF THE DISEASE.

Nystagmus seldom manifests itself until the miner has been working for some years. In the case of boys getting it there may be some refractive error or hereditary element. One boy I examined, aged 15, who got nystagmus after working three years, was the son of a collier who admitted having had trouble with his eyes, but had not been on compensation for it.

The first stage of the disease may be called latent nystagmus. The patient may be perfectly unconscious that he has anything wrong with the eyes, although nystagmic movements may be quite obvious and definite.

One case I examined for an injured back, and who then had nystagmus, worked ten months before being certified for it; another who also injured his back over two years ago has not yet been certified; so that as long as the disease remains in the latent stage, unperceived by the patient, it does not seem to interfere with his work. I do not know how long this may continue, or whether the movements are continual or only periodic.

There is in many cases a general and increasing nervous irritability, and then a blow or sudden fright is sufficient to break down the co-ordination of the ocular muscles, and the power of accommodation to see with moving eyes is lost. The man then discovers that he has nystagmus.

When the disease comes on naturally the first symptoms may be various. In some it is the lamps that seem to move or become blurred, or he becomes dazzled by them; in others headache or pain in the eyes, or else everything becomes misty and he is lost in a fog.

When movements are well developed everything seems moving about, and he becomes giddy and staggers. Bending down, or sudden movements increase the trouble; so does fright. A man may be able to walk about the street well enough, but, if a dog barks or if some one shouts at him, he is immediately lost in a fog and staggers about, quite unable to see what is coming or where he is going. Hence the danger of such men working in mines.

The most constant symptoms are headache, giddiness, and movements.

My records are far from complete, and I find only 43 per cent. with these three symptoms noted; but my impression is that fully 60 to 70 per cent. have them all. Giddiness and movements, but without headache, also occur, and I find 7 cases with the definite record of *no* headache, and 6 in which headache is not mentioned. Of these 13 cases, 8 were rotatory, 4 lateral, and 1 mixed.

Intolerance of light and continual headache are frequent, and in severe cases the man can only sit about with his eyes shaded and his back to the light. In such cases there may be an error of refraction as well.

One variety often passes into another, a rotatory to a lateral, or vertical to a rotatory with nictitation. Nictitation often comes on late, and may be the last objective symptom visible, but in some cases it is present early, with very indefinite movements of the eye.

The two eyes may be unequally affected, or have different movements, one lateral the other vertical or rotatory, but I have never seen two eyes rotating in opposite directions.

The greatest discomfort and pain in the head is caused by the very fine and quick movements, and the least by the slower rotatory. An error of refraction may cause persistent headache, and delay recovery unless corrected by proper glasses, which, however, cannot be worn in the pit.

VARIETIES.

I have divided them as follows:

1. *Lateral.*—An alternating clonic spasm of the interna and external recti.

2. *Vertical.*—An alternating clonic spasm of the superior and inferior recti.

3. *Rotatory.*—An alternating lateral and vertical nystagmus in regular sequence producing rotation. In one case with a large and flaccid eye it was quite easy to see the tug of the several rectus muscles at their insertions into the globe.

4. *Mixed.*—An alternating lateral and vertical nystagmus in irregular sequence, producing rotation but irregular movements.

5. *Oblique.*—Presumably a synchronous contraction of a superior with one of the lateral recti alternating with the inferior and the opposite rectus. It could also be produced by the two oblique muscles if the deviation of the axis is not corrected by the recti.

6. *Axial Rotation.*—Alternating spasm of the superior and inferior obliques, with no deviation of axis. I have one case, which seems the most remarkable of the series. Co-ordination of the recti had not broken down, otherwise there would have been oblique nystagmus. But the only movement visible was rotation on the antero-posterior axis.

7. *Nictitation.*—Clonic spasm of the orbicularis muscle. Generally associated with some other movement, but sometimes present alone. As it occurs with considerable frequency, I think it should be classed as a variety of nystagmus.

DIAGNOSIS.

This is easy enough in the majority of cases. On asking the man to fix an object, such as the finger, held so that the eyes are turned upwards a little, the movements may be seen as soon as he fixes it, or may not appear until he has been staring at it for a few seconds. Often no movements are seen if he is still, and only appear after making him bend up and down quickly, or on turning his head from side to side.

Still, if no movements are seen, nystagmus may be revealed by getting the light to fall on the sclerotic, so as to make a bright spot. This may be seen to quiver, although no movements of the iris can be seen, even with a lens. This is the sort of case I have labelled "indefinite," and gives the greatest trouble to diagnose. It requires good eyesight on the part of the examiner, and for this reason I think certifying surgeons and medical referees should be required to pass a sight test periodically.

In some cases movements can only be seen when the man is bending down.

In cold weather, washing the face with cold water and rubbing vigorously with a towel will demonstrate nystagmus, or putting the man in a dark room and suddenly lighting a match.

If all tests fail, one should suspect some other cause, such as an error of refraction, particularly astigmatism. When headache and blurred lights are complained of, glaucoma is to be excluded; and, lastly, there are other causes of nystagmus than coal-mining, and the diseases of the nervous system must be considered and excluded before certifying the case as miner's nystagmus.

I had one case of the indefinite class, who received compensation for a considerable time, and who was admitted to a hospital for some intracranial disease from which he eventually died. No nystagmus was observed while he was in hospital, but he had optic neuritis. This man was certified on subjective symptoms only. It is all very well to certify cases on subjective symptoms just because a man happens to be a collier, but it is very difficult to disprove a claim for compensation if there are these indefinite symptoms, which may, after all, have nothing to do with miner's nystagmus.

ANALYSIS OF 100 CASES.

These are taken just as I noticed they had nystagmus, and without regard to whether they had been certified or not.

Seven were relapses, and counted as fresh cases.
One man had one eye, and one had one good and one useless eye, while two had bad squints.
There were 18 latent cases. Of these—
8 first noticed nystagmus after a blow on the head.
1 had it after a blow on the head, but was not aware of it. It is 16 months ago, and he has not been certified yet.
5 after blows on the eye or eyebrow.
2 after blows on the back; neither was aware of it.
1 after a blow on the leg. He developed nystagmus 6 weeks afterwards, while he was still above ground.
1 after a sprain of his side.

The average age at the commencement of the disease was 35½ years.

The average number of years men had been working underground was 21¼ years.

The average period between first noticing eyes and leaving work was 8 months, but this includes 3 cases who noticed them from 2 to 8 years before. If these are excluded, the average period is 6½ months.

The average period of disability for all cases is 5 months. but, as I have included latent and uncertified cases, this is, if anything, an under-estimate. A number resumed work on the surface before complete recovery.

The longest period was 28 months, and he has not yet recovered. The shortest was three weeks. Four cases of over 12 months' duration have not recovered yet.

Varieties Met With.

As there is seldom a hard-and-fast line to be drawn between them, these are classified according to the most pronounced movement.

Of 14 cases in which nictitation was a prominent symptom, those with some other movement, such as vertical or lateral, are included in those classes, and those with no definite movement except nictitation in the indefinite. There were: Rotatory, 27 cases; lateral, 25; indefinite, 18; vertical, 12; mixed, 12; not recorded, 5; axial rotation, 1; oblique, 0; total, 100.

Prognosis.

As far as my limited experience goes, those men who remain at work struggling for months against the disease until obliged to give up take the longest to recover, especially if old.

Given a youngish man who has been underground for, say, ten to fifteen years, and who comes out early, say in two or three weeks after first noticing his eyes, he will probably get well in two to four months in summer and somewhat longer in winter. The sooner the man with nystagmus leaves off work the better will be the prognosis; but in the early stages the diagnosis is more difficult, as there may be no definite objective symptoms visible.

I have not been examining long enough to say whether the disease is in some cases incurable.

Some inference as to the duration may be drawn from the variety of nystagmus. The average duration for the 100 cases was five months.

1 case of axial rotation recovered in	6	weeks
18 indefinite cases recovered in an average of	3	months
27 rotatory cases recovered in	4½	,,
14 cases associated with nictitation recovered in	5	,,
25 lateral cases recovered in	5½	,,
11 vertical cases ,,	6	,,
12 mixed cases ,,	8	,,

So it appears that the mixed cases—that is, the cases with the greatest inco-ordination—take the longest to recover.

The rotatory and indefinite take the least.

Of the 4 cases not recovered after twelve months, two were mixed, one vertical, and one lateral. Fewer recover in winter than in summer.

I find that in my cases last year twice as many recovered in the six months April to September as did in the months October to March, and this year the difference is still more striking; for where one man recovered in the first three months, six recovered in the second. In summer they get more daylight and there is more colour about the country.

Relapses.

One would expect that as coal mining produces the disease, so resuming work underground would produce relapses. How many of these cases will relapse, or how long it will take, I do not know. I have not had time to see yet. For the seven cases of relapse included in the 100 the average time from resuming work to the relapse was twelve months. Two more have been observed with recurrence, but have not ceased work. One of these is now two years after resuming.

The variety of nystagmus in a relapse is not always the same as in the first attack.

Treatment.—Preventive Measures.

In the old days of thirty or forty years ago, it seems the custom was for boys to begin work underground at about the age of 7 or 8. With such immature eyes one would think they would be more likely to get nystagmus than the modern boy who begins at about 13 or 14.

But, with the increasing modern education and higher development of the nervous system generally, there may also be a greater tendency for the nervous mechanism to break down under stress. Time will show, but I expect the more developed boy will run less risk of getting it.

The importance of daylight seems to have been overlooked both by the miner and the employer. I take the view that, as far as nystagmus is concerned, working underground in daytime is a mistake, as the miner in doing so loses his opportunity of refreshing the eye by looking at colours in daylight, and so, in a measure, compensating himself for working by artificial light without colour relief.

To get this relief, the hours of work might be altered somewhat as follows:

Start work at the pit head	4 a.m.
Come out	12, mid-day.
Allow an hour to get home at	1 p.m.
Recreation and see the world till	6.30.
Bed	6.30 to 2.30 a.m.
Breakfast and get to pit head by	4 a.m.

He would thus get some four or five hours of daylight all the year round, which is of far more value to the eye than artificial lights.

To prevent unnecessary fatigue to the eyes removable shades should be provided for the lamps, so that they give out light in front only. These should be used in going in and out. When at the "face," they could be taken off, so the light would not be interfered with. With the shade on the man simply wants to see the ground in front of him and the roof to prevent him knocking his head.

The last and somewhat revolutionary preventive remedy I have to suggest is to introduce some sort of a colour scheme into coal mines, no matter how, and thus, if possible, to bring them into a condition at least as good as lead mines. I have not been down a lead mine, but have seen the ore coming out of one, something about the same colour as coke; but the difference is sufficient to eliminate nystagmus, and that is the important point.

As the essential cause of nystagmus is absence of colour, I take it that the one rational preventive measure is the substitution by artifice of sufficient colour to make good the deficiency.

To do this, I suggest that the roof, the leeward sides of the posts and collars, the cogs and sides of the alleyways be coloured with some light but inexpensive wash—whitewash, or, preferably, green or other varied colours.

The dust in mines travels in the direction of the air current, and so it would probably be useless to wash the windward sides of the timbers, but the other side, being protected from it, would last, at any rate, some hours.

The colouring would have to be done daily, and would cost money; but nystagmus costs money.

Suppose a colliery has on an average 100 men on compensation for nystagmus, it loses £100 a week in cash and more in other expenses, and the loss from the men being idle; and, as a collier generally earns more than £2 a week, the colliers are also losing more than £100; thus there is considerably more than £200 a week being lost

between the two parties. To prevent such a loss both parties might well co-operate.

If a quarter of the sum lost through nystagmus were spent in continually colouring the mine, and was enough to bring its colour relief up to the level of a lead mine, I do not see why nystagmus should not be abolished, and the other three-quarters of the loss wiped out.

We must remember that it takes about twenty years to produce the disease, and that in a lead mine there is not a great deal of colour. Quite possibly it may not be necessary to get as much colour as that.

The net result of such a procedure can only be found out by experiment, and one persisted in for a considerable time.

MEDICAL TREATMENT.

The first thing to do is to remove the cause; that is, stop work underground. Let the patient rest, and in subdued light if he has photophobia.

We have to deal with a state of exhaustion and increased nervous irritability. Therefore at first medical treatment should be sedative; such as the bromides or hyoscyamus.

Later, these should be replaced by stimulant tonics and brighter light as he can tolerate it. To commence with stimulants seems to me like whipping up a tired horse instead of resting it.

Mechanical.—Eye shades, blue or smoked goggles give a good deal of relief in some cases, especially in sunlight and snow, but fail in others. I should like to see other coloured goggles tried, particularly green. One man recently told me that when his eyes are very painful he only gets relief on going into a green wood or field.

Proper glasses should be prescribed to correct errors of refraction.

Electrical.—I have not seen any cases that I am aware of being treated by electricity. In chronic intractable cases there seems a fair field for experiment with various forms of electrical treatment.

Special Departments in Hospitals.—Whether it would be profitable to provide green or other coloured rooms, and take in cases as in-patients and apply other special forms of treatment is uncertain. Very likely some way of cutting the disease short could be discovered; but, personally, I think better value for the money would be gained by the preventive measures I have indicated.

[An apparatus designed to show the visual effects of lateral nystagmus was exhibited.]

ON THE CAUSE OF NEUROPATHIC STATES.

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AT the meeting of the Societies of Neurology and Psychiatry in Paris on December 9th, 1909,[1] a remarkable difference of opinion upon the part played by the emotions in the genesis of neuropathic states was found to prevail among the eminent members who took part in the discussion. In initiating the séance M. Déjerine maintained that emotion was the sole cause of neurasthenia; pointed out that prolonged emotion—not necessarily violent—was more often the cause than emotional shock; and insisted that in the development of neuropathic states in the infected, the intoxicated, and the overworked the most active etiological factor was the underlying mental perturbation—the tendency to worry. He thus implied that neurasthenics were endowed with a special nervous organization or temperament, which under deleterious influences was suitable for the development of neuropathic states. This temperament determined the individual's power of self-control in periods of emotional stress; it varied in degree in different individuals, and in the same individual even at different age epochs where the temperament was but feebly present. Neurasthenia, he thought, appeared only after many battles, but self-control survived each encounter with increasing difficulty until the neurasthenic state was fully developed. Such patients are in large measure accidental neurasthenics. An infinite variety of types unites this acquired form to the true constitutional neurasthenic. The clinical picture of any case of neurasthenia depends entirely upon his temperament, character, reactions, former affectivity, etc.; hence cases vary, but are all identical in the main features of the disease—the lack of self-control in times of emotion.

M. Sollier agreed that the emotions played a fundamental part in the development of neurasthenia, but thought that in neurasthenia there was a special reaction of the nervous system to emotions, which might be constitutional or hereditary, and that the part played by the emotions was only that of the exciting cause.

Directly opposing those views was M. Babinski, who asserting that such conditions are never the result of shock, added weight to his contention by reporting a series of observations which he made among classes of the community who daily witnessed people exposed to emotional stress. He had interrogated among others the *post-mortem* attendants of the large Paris hospitals. Some of those attendants had witnessed as many as 200,000 people identifying in the mortuaries their deceased relatives or friends. These people, he contended, had undoubtedly been exposed to great emotional strain. He elicited from the attendants that never had they witnessed amongst all those visitors any who had exhibited an indubitable hysterical attack. He further instances the immunity of the members of the Aero Club de France from neurasthenic states, and referred to the striking absence of hysteria found by M. Neri after the earthquake at Messina. From these data he concluded that an exaggerated importance had been conferred upon the rôle of the emotions in the production of neurasthenic states. M. Déjerine, in reply, stated that those who were chosen from the sorrowing household to undergo the ordeal of viewing the body were only the strongest and most composed members of the family; the more emotional members remained at home, where they may have had their attack; and further, it was quite possible that even those members who came to view the remains had passed through an attack before leaving their home on their painful mission. They did not, however, come unprepared; they had been tuned up to their ordeal; and as a parallel he instanced the absence of neuropathic states in soldiers during battle, and its presence in prolonged sieges, involving hardships and privations of all kinds. Not only were those mortuary visitors in a measure prepared for their ordeal, but the amount of shock experienced by them would almost certainly vary with the cause of the death, whether it had been sudden and under tragic circumstances, or a not unexpected result of bad health or old age. M. Babinski's statement seemed to M. Déjerine to show that sudden emotional shocks were not so important as long-continued anxiety. So also the inquiries of M. Neri into the effects produced on the inhabitants at Messina after the earthquake, cited by M. Babinski, strengthened M. Déjerine's contention, for as the inhabitants were in a measure forewarned, and as they suffered collectively, not in isolation, there was thus established a resistance which prevented the shock from acting so acutely as it otherwise might have done.

M. Crocq stated that neurasthenia did not essentially demand for its development either an hereditary or a constitutional predisposition, the essential factors in its production being overwork, especially mental, intoxication, and prolonged intense or frequently repeated emotions even of average intensity. To support this statement he cited three cases, one of which, bearing upon the effects of sudden shock, was as follows: An advocate, 55 years of age, whose parents had died of old age, and whose brother and sister were well, was working in his office preparing an interesting "pleading." As he casually and inadvertently looked through the window he saw passing through space his son, who had fallen from the window above. The shock of the accident was such that on the following day the unfortunate parent presented the classical symptoms characteristic of neurasthenia. Neurasthenia, M. Crocq went on to say, frequently aggravates the immediate results of disasters, especially railway accidents.

M. Pierre Janet trenchantly criticized the investigations. He asserted that if the same inquiry had been conducted by another than M. Babinski the results might have been quite different; he also pointed out that hysterical attacks were not of instantaneous development; that the visitors may have had their attack outside the mortuary, or even at home before or after the viewing of the body; and that those who did come to view the body would certainly be the least emotional members of the family. He clearly recognized such a condition as constitutional neurasthenia. That such a condition existed was admitted by M. Vogt, but he was inclined to believe that in the constitutional neurasthenia there was probably as the basis of the malady some defect in cerebral nutrition.

Following him M. Henri Claude, in a few apt words, clearly showed that not only did he agree with M. Déjerine, but also that he supported M. Sollier in the importance which he attached to the predisposition. This predisposition he pointed out might come from inherited mental degeneracy, but that owing to a series of emotional storms conduced by injudicious education, intellectual overwork—in fact, by long exposure to emotional influences—it could also be acquired. So the discussion proceeded. "Wherever and on whatever questions good men are found ranged on opposite sides, one of three alternatives is always true: Either the points of disagreement are purely speculative and of no moral importance—or there is a misunderstanding of language, and the same thing is meant under a difference of words—or else the real truth is different from what is held by any of the disputants, and each is representing some important element which the others ignore or forget."[2]

We may now try to discover the truths common to the opposing parties, M. Déjerine and M. Babinski, in this discussion. Let us consider a normal sensory stimulus with a motor expression. The stimulus impinges on a sensory end organ, the changes initiated there are transferred along an afferent nerve to a central nerve cell, where they excite an activity which is conducted by means of an efferent nerve to a motor organ, and thus the external response of the organism to the sensory stimulus follows. To the same stimulus the same motor response will invariably be given so long as the sensory motor arc is intact. Response to each stimulus is accompanied by electrical and chemical changes, and too frequently repeated, too violent, or too prolonged stimulation may induce fatigue and impair the delicacy and the integrity of the primitive reflex arc. If now we interpose one synapse in the afferent and another in the efferent track, so that an alternative course is provided both for the ingoing stimulus and the outflowing response, then, if the arc be functioning normally, the sensory stimulus flows in a definite direction—as does the motor response also—for the resistances normally offered at each synapse determine the natural direction of the nerve flow; the current flowing in the natural direction is proceeding along the path of least resistance—that is to say, the resistance in the natural path is normally lower than the resistance in the alternative path.

According to McDougall's theory,[3] fatigue exerts its protective influence by elevating the resistance at the synapse, so as to block the normal course of the nerve current, and thus in the afferent path inhibit it reaching the cognate central perceptive centre; or under circumstances, such as excessive fatigue, a point may even be reached where the current may thus be diverted to an alternative path, led to an unnatural central perceptive centre, and so induce an unusual response. If in the efferent track any morbid process effects the same heightening of resistance at the synapse as does fatigue, then, although a sensory stimulus may be correctly perceived and interpreted, no response, an abortive response, or an unexpected response results—such as may be seen in the negativism of dementia praecox. What is true for a simple reflex arc also applies to the medley of stimuli which constitute everyday sensations, so, under conditions such as morbid degrees of fatigue, unusual perceptive centres may be linked up with sensory impulses to which they are unaccustomed, and only remotely allied, and thus unnatural external responses result.

Lesions in the sensory end organs are of little concern to us. Undoubtedly pathological states in the Schneiderian membrane, in the retinal layers, or in the auditory apparatus, may cause peripheral perversion of sensations, and may be the starting point of false conceptions of smell, sight, and hearing, and, similarly, morbid changes may arise in the muscular, glandular, or other peripheral mechanism of emotional expression, but the lesions commonly encountered in psychiatry are situated centrally, either in the perceptive centre or in the afferent or efferent track.

A disease such as hysteria is obviously a lesion of the highest perceptive centres; the stocking, glove, band, or section of limb areas of anaesthesia, or the well-known complete sensory loss on one side of the body, do not correspond to any known area of distribution of peripheral nerves, nor are they limited to the sphere of influence of any nerve roots. The stimulus in such cases is correctly conveyed by the sense end organ, by the peripheral nerves, through the spinal cord, medulla, pons, mid-brain, optic thalamus; but somewhere above this point the stimulus is completely blocked—in fact, the area which is insensitive seems to be cut off from its representation in the cortical psychic centres. This isolation may affect not only cutaneous stimuli but also the stimuli of the special senses, particularly vision.

A hysterical subject who when tested with the perimeter exhibits only a microscopic field of vision can thread his way through a crowded room; his visual perception must be functioning subconsciously to enable him to avoid the obstacles, and is probably intact. The lesion in hysteria therefore cannot be a lesion of the primary perceptive centre; the interruption must be situated between the primary perceptive centre and the higher psychic centres.

Such areas of anaesthesia are typically inconstant in size; the mere advance or recession of the anaesthetic boundary denotes only that the continuity of the sensory stimuli is preserved to a lower or higher level, but does not indicate that the sense impression then attains to the highest psychic centre which would be its destination if the brain was functioning normally. This highest centre, the seat of intellectual control or judgement, is necessarily the recipient of myriads of stimuli reflected from all parts of the brain, which have been roused to activity by the sense impression; in other words, the primary stimulus reaches the highest psychic centre enormously reinforced, multiplied, and embellished, and in a corresponding fashion intermediate psychic centres between the highest level and the primary perceptive centre are affected, but in direct ratio to their level—the higher the level the greater is the number of stimuli referred to them, the lower the level the less—until the primary perceptive centre, the lowest of all, is subjected merely to the activity of the initial stimulus. As the cells in the highest psychic levels are subjected to more stimuli than those at lower levels, the resistance at the synapses of the cells of the highest psychic level will earliest reach a point which stimuli find difficulty in overcoming—that is, fatigue first appears there, and, if the excitation be continued, the stimuli may be entirely blocked; later the process passes down to the lower levels. The blocking of a stimulus at a synapse may not be complete, but what passes the synapse is ineffective in transmitting the original stimulus. Further, the blocking of the stimulus only implies an interruption for that particular degree of stimulation. But, if the stimulus be slightly increased, the current will again pass, and will continue to flow until fatigue reappears, and the heightened resistance at the synapse gradually blocks the current once more; if the stimulus be further increased, the flow will recommence.

The nature of this resistance may be primarily due to physical changes in the protoplasm of the synapse, but sooner or later chemical changes must also occur in the nature of a breaking down of the protoplasm; probably every change of resistance at the synapse is a physical accompaniment of a chemical change in the neuron. Also, *pari passu* with changes at the synapse, metabolic processes must occur in the nerve cells, the resistance of various synapses are merely the expression of the normal available energy of the cell; thus, in fatigue is attained a mechanism by which the neuron is protected from all stimuli of ordinary intensity, and thereby an overdraft on the vitality of the neuron is prevented; the most vital neurons must be those which are most frequently in use.

Within the limits of the nutritive capacity of a neuron frequent use with adequate intervals of rest will tend to increase the reserve store of energy in the cell. By some such mechanism as this, by the acquisition of a lower resistance in some than in other neurons, stimuli are diverted constantly into the same channels—the channels which offer least resistance to their passage. Thus habits arise and a temperament is built up.

The energy of a neuron is definite in amount; apparently each cell contains a certain amount of protoplasm which is capable of being readily broken up to liberate energy. After its expenditure, further excitation exhausts first the reserve stores of energy in the cell, a process accompanied by a definite structural alteration such as diminution in the number and size of the Nissl's granules, and, if continued, causes the disintegration and diffusion of the nucleus and other phenomena significant of death of the cell. The energy of any neuron may thus be accumulated into several divisions, according to the readiness with which it can be liberated. The ease with which the neuron yields energy from its protoplasm depends upon the degree to which that protoplasm has entered the structural organization of the neuron, hence a resistance at the synapse rises as the demands upon the energy of the cell encroach upon the cell's vitality. So when stimuli of certain intensity have exhausted the energy available for that intensity the synapse blocks the continuance of such stimuli and thus permits anabolic processes to rebuild the reserve of the cell.

In normal life as the day advances the available store of energy is gradually expended, and the resistance at the synapse is slowly raised until towards night normal stimuli are all but blocked, and the condition known as fatigue is thus developed. Rest follows, the energy re-accumulates in the cell, and the resistance gradually falls. There is thus daily a certain degree of exhaustion, and this process is physiological. It is commonly experienced that the reserve supply of energy of the cell may be considerably encroached upon without pathological results, but then, to ensure a return to the normal nutritive state of the neuron with the special resistance which characterizes it, a more prolonged period of rest is necessary. If now in the absence of adequate rest such a fatigued neuron be again excited, the reserve store of energy of the cell will be still further depleted; and if this exhausting process of frequently repeated, excessive, or prolonged stimulation is continued without intervals sufficient to permit the neurons to return to their normal state the reserve store of energy in the cell will become exhausted, and the resistance at the synapse will be maintained at a level which effectually blocks all ordinary stimuli; or the process may even go further, and the organic integrity of the neuron be impaired. The same result may obviously be attained by grossly excessive stimulation for a short period. In everyday life the gradual dissipation of this neuron energy is seen in cases of chronic strain and its sudden exhaustion in shock. Thus the vitality of the neuron is threatened, and neuropathic states are produced.

Brains differ in their reaction, and this difference we recognize as temperament. The difference in nervous organization is well demonstrated by the action of toxic substances. Quite apart from the difference in cerebral reaction so often observed in acute toxaemias, such as in typhus, this distinction is well exemplified in the diversity of the reactions produced in different individuals to chronic alcohol poisoning. In chronic alcoholic toxaemia the results show themselves in many ways: in some delirium tremens appears, in others progressive cerebral deterioration often accompanied by a tendency to epileptiform seizures, and in others again, apart from slight weakening of control and memory, the stress of action falls on other organs.

The same uncertainty of action is seen from the toxaemia of syphilis; one case develops general paralysis of the insane, another cerebral syphilis, another locomotor ataxia, while a fourth may show no nerve lesions at all. The nervous system in different people must vary in its resistive power, and different brains exposed to the same influences are liable to differ in their reaction.

Having now considered the mechanism of cerebral action and of cerebral fatigue, and having shown how prolonged fatigue may merge into a morbid process which requires more than normal physiological rest, or even how under special circumstances the nerve exhaustion may approach to being irreparable, and having further demonstrated that the readiness with which different brains become fatigued is variable, let us now examine M. Déjerine's and M. Babinski's contentions.

Emotion implies expenditure of nerve energy; prolonged or intense emotions must therefore involve exhaustion. The more frequently they are repeated, the less the interval the neuron is allowed to rebuild its store, the sooner will complete exhaustion be attained. Overwork is merely one form of dissipation of energy, so also is worry, and M. Déjerine's contention that the worry is the more essential factor merely expresses that the overwork must be an intermittent, whereas the worry may be a source of continuous degradation of nerve energy. His further assertion that such chronic causes are more important than sudden causes such as shock, is merely an expression of the relative incidence of chronic strain and shock in any community. The worrying temperament, the constitutional tendency to neurasthenia to which he gave prominence, indicate a quality of ready "fatigability" inherent to such cases. This inherited quality implies on the part of the synapse a lack of power so to arrange the resistance as to shut off stimuli from a fatigued cell. In such patients resistance at the synapse does not rise *pari passu* with the work done. The cell is thus exposed to a continual series of small or great demands irrespective of the state of its reserve store of energy; hence the neuron may continue to work till it is quite exhausted. The fault probably lies in the failure of the neuron to incorporate an adequate amount of the protoplasm into its own structure. Thus the protoplasm of the neuron is left in an insufficiently elaborated state, a state of greater chemical instability than is normal, a state therefore which permits of a constant liberation of energy practically as long as any protoplasm remains in the cell.

As regards M. Babinski's contention that such conditions as neurasthenia and hysteria were never the result of shock, he dealt with people who from surroundings, occupation, and mission were specially selected on account of their mental stability. He proved that mentally stable people attuned to a shock usually experience it without detriment. This was not under discussion, and was not denied. If stimuli could be devised for M. Babinski's mentally stable individuals of the same relative intensity to them as the exciting stimuli were to the patients of M. Déjerine and his followers similar results of shock would be observed.

The whole discussion merely emphasizes what I have already maintained,[4] that there is an inherited or acquired structural predisposition—an emotional diathesis. A more important point clinically is the determination of the actual extent of the lesion, whether it is reparable or not. About this our knowledge is very scanty, and its further investigation is urgently needed.

Taking the mechanism which I have suggested as the mode of origin of neuropathic states, definite indications for treatment necessarily follow. To ensure as complete rest as possible—that is, to ensure the absence of any fresh external stimuli—isolation is necessary. It is not only a means of husbanding the patient's resources, but it has also a certain psycho-therapeutic value. To treat accompanying dyspepsias, constipation, sleeplessness, or other symptoms, complete rest in bed in the open air—combined with suitable diet—massage, with baths and electricity, are necessary to eliminate from the disease any accompanying autointoxication and malnutrition. The most favourable conditions for the nutrition of the nervous system of the neurasthenic are bodily health and mental rest. If after these conditions have been maintained for three months no considerable improvement has been made, the lesion is probably irreparable, and the only hope of amelioration would appear to lie in education, either by suggestion or other psycho-therapeutic measures.

My best thanks are due to Dr. W. J. Maloney for his kind help and suggestions.

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SEVENTY-EIGHTH ANNUAL MEETING
OF THE
British Medical Association.

Held in London on July 22nd, 23rd, 25th, 26th, 27th, 28th, and 29th.

PROCEEDINGS OF SECTIONS.

SECTION OF PHARMACOLOGY AND THERAPEUTICS.

Professor ARTHUR ROBERTSON CUSHNY, M.D., F.R.S., President.

DISCUSSION ON LACTIC ACID THERAPY.

OPENING PAPER.

I.—OTTO GRÜNBAUM, M.D., F.R.C.P.,
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A DESCRIPTION of the history of the introduction of the treatment with lactic acid-forming bacilli would be of great interest, but the time at our disposal, I think, will be better spent in discussing the theory and practice rather than historic anecdote. I propose to direct the discussion into the following channels: (1) The theory of the action of the lactic acid-forming bacilli; (2) the method of administration; (3) the diseases which benefit by the administration.

Theory of the Action.

Some seem to hold the view that lactic acid-forming bacilli of the same group as *Bacillus bulgaricus* are able to destroy putrefactive bacilli in the same way as phagocytes can deal with bacteria. This is not the case. Their action comes from their power of manufacturing lactic acid; the presence of this acid is inimical to the multiplication of putrefactive micro-organisms. Evidence in support of this statement is to be found in the work of Metchnikoff, of Hayem, Singer, and others. Many will ask: How, then, does the administration of the lactic acid bacillus compare with the exhibition of antiseptics, or lactic acid by the mouth? To my mind the great advantage of the lactic acid bacillus is that it forms lactic acid where it is of value; if an antiseptic is given by the mouth it is absorbed in the stomach or small intestine, and does not reach the large intestine, the main site of the multiplication of putrefactive micro-organisms.

The Method of Administration.

Some five years ago I began prescribing lactic acid-forming bacilli, and obtained good results in certain cases. But many of these relapsed, and this led me to investigate the tablets which were alleged to contain myriads of active bacilli. Upon bacteriological examination I found that it was an even chance whether the tablet contained any living bacilli, and then I had no guarantee that the bacillus which multiplied was not almost upon the point of dissolution at the time that it was introduced into the milk medium, and would therefore not have been able to withstand the somewhat perilous and trying journey through the stomach. Therefore, for the last four years I have always ordered milk in which there are millions of bacilli per c.cm. It is not my intention to advertise any special brand, nor to waste my time in law courts defending actions for libel, by telling you what I think of other brands. All that I need say is that there are quite a number of preparations upon the market which contain a very large number of *Bacillus bulgaricus*, and comparatively few cocci; preparations of this kind have a distinctly sharp although pleasant taste.

If we agree that the beneficial action is due to the antiseptic properties of the lactic acid formed in the intestine, it is obvious that it does not matter whether the acid is formed by the *Bacillus bulgaricus* or by a streptococcus. There are, however, two advantages in choosing milk containing the *Bacillus bulgaricus*:

(*a*) Microscopic examination permits us to judge whether there is much contamination. If there are many streptococci present, it is difficult to say whether these have been introduced on purpose or whether they are an accidental contamination.

(*b*) The *Bacillus bulgaricus* is a more active lactic acid producer than most of the lactic acid-forming streptococci. It is, however, asserted that the preparations with the pure *Bacillus bulgaricus* are less palatable than those containing other bacilli.

Having selected a suitable brand, we have to decide in what quantities and how often it should be administered, and, in addition to this, what steps should be taken to prepare a suitable nidus for the bacillus in the intestinal tract. It is my custom to order patients who are to take the lactic acid bacillus a special diet during the first four days of the treatment. This diet consists of much carbohydrate and a fair quantity of malt extract; proteid food and fats are limited. Since carbon dioxide is evolved in converting the carbohydrate into lactic acid, it is wise to warn the patient that it is not unlikely that flatulence will be increased temporarily. After the bacillus is established a physiological diet may be prescribed with advantage. The importance of beginning the treatment with the suitable diet is, in my opinion, so great as to render valueless these observations which are based upon cases in which it has been omitted, with the exception of those in which bacteriological evidence has proved the presence of the lactic acid-forming bacillus in the faeces.

The next question which arises is the quantity and frequency with which the micro-organism should be administered. It is a mistake to think that the more acid the milk the greater number the bacilli. Lactic acid-forming bacilli, like many others, tend to be killed by their metabolites. The preparation of milk should be curdled, for without this it is necessary to prove the presence of bacilli; but it should be only just curdled, for in this stage it contains many young and vigorous bacilli, and does not possess an acidity which is objectionable to the average palate. The course of treatment should be begun with a third of a pint of curdled milk taken thrice daily, but after the third or fifth days this may be reduced to a quarter of a pint twice a day. When this plan is adopted it is rare for the patient to develop an insuperable dislike to its taste, but if there be a tendency towards this it is wise to let the preparation be taken upon alternate days. Occasionally patients develop a liking for the preparation, and continue taking it indefinitely. I have not met a single case in which this preparation has done harm, in spite of the rumour that rheumatic pains occasionally become worse from its administration.

We now come to the discussion of the kind of cases which are likely to benefit by the treatment, and I think these may be divided into three classes:

(*a*) Conditions in which the micro-organism which causes irritation of the intestinal mucosa does not flourish in a lactic acid medium.

(*b*) Cases in which the toxins produced by the putrefactive micro-organisms in the intestine are too readily absorbed or eliminated with too much difficulty.

(*c*) Certain cases of *maladie imaginaire*.

(*a*) Amongst the first series must be included mucous colitis. One occasionally comes across the assertion that all cases of mucous colitis are simply manifestations of neurasthenia. A dogmatic statement of this type is as incorrect when applied to mucous colitis as when applied to any other disease. A certain percentage of cases are, I believe, of neurasthenic origin, but not all. With very few exceptions, cases of pure mucous colitis have been benefited or cured by the lactic acid-forming bacillus treatment. Now, if this were purely the effect of suggestion, it would be difficult to understand how the patients who have been through many treatments, including visits to Plombières, should express a certain amount of displeasure or annoyance at not having been put upon the treatment before; they had had many chances of being treated by suggestion, yet none had acted. This is too frequent an occurrence in mucous colitis to permit of the conclusion that it is pure chance. In several cases the type of patient has been far removed from that which one associates with neurasthenia.

Some cases of gastric disturbance improve whilst under treatment, and find such benefit that they continue it indefinitely. These, I imagine, are due to some abnormal micro-organism in the stomach, which is causing a gastritis, but this I do not put forward with any confidence because I have not investigated them. As a rule gastric cases are not improved by a course of this treatment.

(*b*) Cases which suffer from autointoxication are not so common as one would be led to suppose from the French literature of medicine. It is of interest to note that frequently a high ratio of ethereal to mineral sulphates in the urine is associated with languor, headache, pallor, and that by giving lactic acid-forming bacilli the ratio of ethereal sulphates diminishes, and the patient improves; and this without any other treatment. I believe that a course of intestinal antiseptics such as calomel would probably produce a similar result, and I do not claim that the lactic acid treatment is the best for cases of this type. The condition in which there is great difficulty in eliminating toxins usually arises from disease of the kidneys, and it is in this complaint that I have observed very great improvement follow the treatment.

Possibly the outline of a case which to my mind gave very definite evidence of a beneficial effect of the treatment, may be of interest. A man of about 44, who had suffered from renal disease for fourteen years, had reached the stage in which nausea and vomiting were extremely distressing; headache and giddiness were corroborative symptoms of uraemia. The diet had for several years been that which is usually ordered in renal disease. He was placed upon the lactic acid bacillus, and gradually improved. In July he moved to Scotland, where the cook was entrusted with the preparation of the milk. The man's condition slowly became worse, and he returned to London. On being seen by his practitioner here, he was recommended to cease taking the lactic acid bacillus. No improvement occurred, and I was asked to see him again. Upon inquiry, I found that the cook in Scotland had noticed that if the milk was left it became too sour for the patient to take, and that she could prevent this by boiling it, which she had done regularly during the time the patient was in Scotland; this, of course, killed all the lactic acid-forming bacilli, and the patient had been fed upon dilute lactic acid and milk. He improved markedly from the time upon which he was placed once more on the lactic acid bacillus treatment.

I could cite several cases of uraemia which have improved temporarily under the treatment, and to an extent greater than I have seen in other cases upon a milk diet or any other treatment.

I am under the impression that some cases of diabetes mellitus benefited by the treatment. Lactic acid is excreted as a carbonate, and thereby it tends to increase the alkalinity of the blood, and to defer acidosis. In addition to this, the lactic acid bacilli will change the carbohydrates in the food into lactic acid, and tend to diminish glycaemia. Diabetics vary so markedly in their reaction to treatment that it would be foolish to make a dogmatic statement upon this matter, and one can only record one's impressions based upon some number of cases. When, however, a treatment seems advisable from the theoretical point of view, and appears to give relief in practice, considerable evidence must be brought forward before throwing discredit upon it.

(*c*) As regards the third class of individuals benefited by treatment—namely, those on whom it acts by suggestion—one must own they will not be harmed by taking milk in this form. It is true that, as the treatment becomes more and more known and more aged, this effect will become less marked, for it was to this class of patient that the physician referred when he advised his colleague to use the new remedy whilst it still cured.

II.—R. Tanner Hewlett, M.D., F.R.C.P., D.P.H., etc.,
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THE BACTERIOLOGY OF SOURED MILK.

Sour milk is an article of diet extensively used in many parts of the world—for example, Sardinia and the near East, Egypt and South Africa, Asia Minor and India. From all these "natural" sour milks bacilli have been isolated having as common characters: (1) Relatively large size, considerable amount of pleomorphism, absence of motility, absence of spore formation, and reacting positively to Gram's stain; (2) growing best at a comparatively high temperature (40° to 42° C.); (3) growing only in milk or in culture media prepared with milk or whey, or in certain special media, and not on ordinary culture media; (4) producing a relatively high percentage of lactic acid in milk. These bacilli seem to be always associated in the natural sour milks with lactic acid-producing streptococci.

The bacilli[1] isolated from the natural sour milks have received a variety of names, the best known being:

1. The *Bacillus bulgaricus* and bacillus of Massol isolated from Bulgarian yoghurt and maya.
2. The *Streptobacillus lebenis*, from the leben of Egypt (Rist and Khoury).
3. The *Bacillus* or *Bacterium mazun*, from Armenian mazun.
4. The "Granule" bacillus, from Bulgarian yoghurt.
5. The *Bacterium sardous*, from Sardinian gioddu (grixoni).
6. *Bacterium lactis acidi* (Leichmann).

The question arises whether all these are distinct species, varieties of two or three species, or varieties of only one species. The matter has recently been critically reviewed by Makrinoff,[2] who arrives at the conclusion that all the organisms named belong to one species and are identical with the *Bacillus bulgaricus*. It is true variations occur in the organisms derived from different sources, and doubtless different varieties or races exist. But the organisms exhibit considerable pleomorphism and the morphological and cultural characters supposed to distinguish one from another are by no means constant. Thus an organism exhibiting uniform staining for a time may later develop granulation and become a granule bacillus, and one at first typically a bacillus may afterwards become streptococcoid or grow out into threads. I think, therefore, that Makrinoff is probably right in regarding the various characters as inconstant and insufficient to base differentiation into distinct species. Two more or less distinct *races* seem to exist, namely, those that produce viscosity and those that do not. Makrinoff suggests the name *Bacillus leichmannis* to include all these organisms (distinguishing the two races as *viscosus* and *non-viscosus*), but to avoid confusion, for the purpose of this paper I shall continue to term the organism the *Bacillus bulgaricus*.

The origin of these specialized lactic acid-producing organisms is one of some interest. Kuntze regards them as being primarily of intestinal origin and allied to the *Bacillus acidophilus* and *Bacillus bifidus* of the intestinal tract.

The biological properties of the *Bacillus bulgaricus* are of some importance with regard to the preparation and use of soured milk. While the sugars dextrose, laevulose, lactose, galactose, fructose, and mannose are attacked, saccharose and maltose are not attacked.[3] The addition of cane sugar to the diet or to the milk, when soured milk is being taken, with a view to increased production of lactic acid would therefore seem useless to attain this end.

Probably all races of *B. bulgaricus* are equally good as regards production of lactid acid, but some undoubtedly produce products of more acceptable flavour than others, hence the selection of particular races for the preparation of soured milk. Some races also produce the maximum quantity of lactic acid more quickly than others; an admixture of difference races, however, produces approximately the same final amount of lactic acid as any single race. Bertrand and Duchacek state that both dextro- and levo-rotary lactic acids are formed in practically equal quantity in artificial media, but in milk the dextro-acid is in slight excess. Mr. Revis, however, informs me that he believes the dextro acid to be in large excess. Traces of acetic, formic, and succinic acids are also formed. Lactase is alone formed, not sucrase or maltase.

The *B. bulgaricus* does not seem to attack fats and produce rancidity, although statements to the contrary have been made.

A viscous product is probably not palatable to most persons, and the races which produce it should, therefore, be avoided for the preparation of soured milk. Some of the "non-viscosus" races, however, produce some viscosity at a particular stage of the incubation, the viscosity disappearing an hour or two later. This viscosity may be due to the formation of intermediate (?) gummy products analogous to "dextrans" formed by the *B. radicicola* from

cane sugar.[4] Similar substances, "galactans," have been described in ropy milk.

The lactic acid-producing streptococci form less lactic acid than the *B. bulgaricus*, and therefore cannot take the place of the latter organism. These streptococci are, however, always present in the natural sour milks, and their employment in the production of soured milk is very general. Are they of any real value? Probably they aid the growth of the *B. bulgaricus* by producing an acid environment—a condition of some importance, as pointed out by Crithari[5]—though they do not add to the total quantity of lactic acid formed when grown in symbiosis with the *B. bulgaricus*. One useful purpose served by growing the *B. bulgaricus* with a lactic streptococcus is that while the *B. bulgaricus* itself will produce a perfect curd, the curd tends to contract and squeeze out the whey. When the lactic streptococcus is added to the culture this does not occur, and a better mixed and more uniform product is the result. The ordinary *Streptococcus lacticus*, common in all milk, is unsuitable, as its optimum growth temperature is about 27° C. (80° F.) and it grows indifferently at blood heat. The *Streptococcus lebenis* or some similar race should be employed, so that it may flourish with the *B. bulgaricus* at 40° C.

A point of importance in the preparation of soured milk is that if the inoculation from soured milk to fresh milk be carried on from day to day, there is some tendency for the streptococcus to become more and more numerous and to outgrow the bacillus, though probably the latter never completely disappears.

The varying resistance to desiccation exhibited by the lactic streptococci and the *B. bulgaricus* is also important. The lactic streptococci are resistant to drying, and will retain their vitality for months if desiccated, but the *B. bulgaricus* dies out within about three weeks if kept in a dry state.[6] Similarly, if kept in the moist state, for example, in cheese, the streptococcus will persist and multiply, while the *B. bulgaricus* will not multiply and will gradually die out. Hence, if material in tablet form is used for starting the milk cultures, the tablets must be fairly recently prepared for living *B. bulgaricus* to be present, and if the tablets be old the production of a curd and acidity in the milk treated is no criterion of the presence of the *B. bulgaricus*, the result may be entirely due to the streptococcus. Lactic cheeses similarly must be consumed as soon as possible after preparation in order that the maximum number of *B. bulgaricus* may be ingested.

The *B. bulgaricus* maintains its capacity for producing lactic acid indefinitely if kept in milk culture, but if the cultures are kept going on other culture media, loss of lactic acid-producing power ensues, an "attenuation" results. This is another reason why fluid cultures in milk are preferable to the use of tablets for the preparation of soured milk. If it be found that with the use of fluid milk cultures the soured milk obtained is not quite normal, it is far more likely that the temperature of incubation rather than the culture is at fault. There is no doubt that the proper temperature of incubation should be 40° C. to 42° C., and not blood heat; the blood heat temperature (37° C.) may make all the difference with some strains of the *B. bulgaricus*, and an inferior product result.

In the preparation of soured milk, the milk should be sterilized by actual boiling for at least half an hour before inoculation, preferably for three-quarters of an hour or one hour, and not simply simmered or heated in boiling water for a few minutes as is sometimes recommended.[7] Whey is an excellent medium for the growth of the *B. bulgaricus*, and soured whey can often be taken when soured milk is not tolerated. Soured milk also often tends to constipate; soured whey does not constipate, it tends to be aperient. Unfortunately, in London whey is an expensive article, but in cheese-making districts whey might be employed for the preparation of an excellent and palatable lactic product, suitable if soured milk disagreed or if its fattening properties were not desired. Of course, one of the recommendations for the use of soured milk in many cases is its nutritive and fattening virtues, and for such soured whey cannot be substituted for soured milk.

Exception has been taken by some to the preparation of soured milk on the large scale by dairies and other companies. It has been alleged that there is considerable risk of contamination in such circumstances with putrefactive or other undesirable micro-organisms. With care, such objection should be baseless. Provided that proper cleanliness is observed, that the milk is properly sterilized before inoculation, that inoculation is done with relatively massive doses of fresh, actively-growing, pure cultures in milk, and that a proper incubation temperature is maintained—all conditions which there should be no difficulty in observing in practice—the rapid production of lactic acid will maintain the milk as practically a pure culture, and any chance or stray microbe will be prevented from multiplying, will soon be crowded out and will succumb. When we consider the rough and ready way in which the natural sour milks are prepared in their native habitats and their invariable harmlessness, it seems hypercritical to object to the commercial production of soured milk because of the possibility of contamination, always provided, of course, that proper plant, methods, and cultures are employed.

These points emphasize the possible risk attendant on the use of tablets and other dry seeding agents for the preparation of soured milk. It is difficult to prepare them in an uncontaminated form; unless fresh, the *B. bulgaricus* is dying out and present in an inactive form, and nothing like the dose of culture is seeded compared with a fluid milk culture.

Yeasts in small number are frequently present in commercial soured milks, and it seems a very difficult matter to exclude them altogether. I doubt if they do any harm; they are always present in many of the Eastern milks—for example, Koumiss—and their apparent abundance in some samples may be due to the fact that on a plate cultivation they have a great capacity for spreading widely, so that what is actually but a slight contamination or infection may, on a plate, appear to be a very large one.

I have already referred to disadvantages attending the use of tablets as "starters" for preparing sour milk. Quant[8] examined certain tablet preparations, and compared them with a milk culture as regards flavour and production of lactic acid. The milk culture produced 2.34 per cent. lactic acid *B.P.*, the tablets yielded only 0.07–0.42 per cent. lactic acid *B.P.* Moreover the curd and flavour were unsatisfactory. Quant also directed attention to the importance of a proper incubation temperature. He found that, using the milk culture, the yield of lactic acid at a temperature of 105° F. was more than one and a half times that at 85° F., and more than one and one third times that at blood heat.

Samples of fermenlactyl, lactobacilline, sauerin, and trilactine tablets, and a fluid milk culture were also examined for the BRITISH MEDICAL JOURNAL,[9] with the following results, using well-boiled (1 hour) milk:

Percentage of Lactic Acid Produced.

Sample.	After 10 Hours' Incubation.
1. Fluid culture (Oppenheimer) ...	0.96
2. Fermenlactyl tablets	0.00
3. Lactobacilline tablets	0.02
4. Sauerin tablets	0.07
5. Trilactine tablets	0.27

Again, it is shown that tablets produce little or no acid, the fluid culture, on the other hand, producing a considerable amount.

This question of the use of tablet preparations is of importance not only with regard to the preparation of soured milk, but also with regard to treatment, as the tablets are being prescribed in place of soured milk. I have examined a few of the preparations on the market with a view to ascertaining (1) their content of *B. bulgaricus*; (2) their capacity for producing a proper soured milk; (3) the presence of other organisms. The preparations were (with one exception) obtained last week (July 18th to 21st) and were as follows:

1. Sauerin tablets (Allen and Hanbury), inscribed "cannot be guaranteed after November 13th, 1910."
2. Sauerin, liquid culture (Allen and Hanbury), inscribed "cannot be guaranteed after August 3rd, 1910."
3. Trilactine tablets (W. Martindale), *new*.
4. Trilactine tablets (W. Martindale), *old* (January, 1910).
5. Fermenlactyl (Pasteur Vaccine Co.).
6. Bulgarian soured milk chocolates (Rowntree and Co.).

The method of examination was to place a tablet (or 1 c.cm. of liquid sauerin) in 100 c.cm. of sterile water and emulsify thoroughly; with this to prepare various dilutions and to introduce measured volumes of these dilutions into tubes of sterile milk, incubate at 40° C., and examine microscopically films stained by Gram's method. Six cultures were made with each preparation, the amount of the preparation added corresponding to from 0.01 to 0.0000001 (descending by tenths) of a tablet, or of a cubic centimetre of the fluid preparation. The following summary gives the results as regards the presence of the *B. bulgaricus*.

Sauerin Tablet.—The culture with 0.01 gave acid and curd, with *B. bulgaricus* present; that with 0.001 gave acid only, no curd, with a few *B. bulgaricus* present; the four cultures with 0 0001 downwards were all negative.

Sauerin, Liquid.—All the six cultures gave acid and curd, with *B. bulgaricus* present.

Trilactine Tablet (new).—The culture with 0.01 gave acid, no curd, with *B. bulgaricus* present; the remaining cultures were negative.

Trilactine Tablet (old).—All the six cultures were negative.

Fermenlactyl Tablet.—The four cultures with 0.01-0 00001 gave acid and curd, with *B. bulgaricus* present; the two remaining cultures were negative.

Rowntree Chocolate.—Five of the cultures gave acid and curd, with *B. bulgaricus* present; the sixth culture (0.000001) was negative.

It will be seen that the *B. bulgaricus* is present in:

(1) One thousandth but not in one ten-thousandth of a sauerin tablet.
(2) At least one ten-millionth cubic centimetre of liquid sauerin.
(3) One hundredth but not in one thousandth of a trilactine tablet (new).
(4) Not present in trilactine tablet (old).
(5) Not present in fermenlactyl tablet (an occasional rod seen; practically entirely streptococci).
(6) Probably one millionth of a Rowntree chocolate.

These results are of interest as regards the administration of tablets. The number of *B. bulgaricus* taken in tablets will be extremely small compared with that taken in a properly soured milk, for I have found that the soured milk shows the presence of the organism in at least one thousand-millionth of a cubic centimetre. The number of *B. bulgaricus* which get into the intestine from tablets must be very small. I imagine, also, that with soured milk some of the curd passes from the stomach into the intestine, entangling with it vast numbers of the *B. bulgaricus*, and there is no doubt in my mind that soured milk or whey is incomparably the best form in which to administer the organism. The production of soured milk with these preparations was also examined. The tablet, etc., was added to the proper quantity of well sterilized milk—as recommended in the directions with each—and the culture was incubated at 40° C. for twenty-four hours, then examined. The results are as follows:

1. Sauerin tablet = no curdling; no change in flavour. (No *B. bulgaricus*; fine bacillus present.)
2. Fluid sauerin = good characteristic curd and odour; good flavour, very acid (*B. bulgaricus* abundant).
3. Trilactine tablet (new) = mostly whey, with little curd floating in it; not an acid but a buttery flavour (*B. bulgaricus* present, also a large number of a Gram-negative bacillus).
4. Trilactine tablet (old) = whey, with layer of floating curd; slight cheesy odour; not acid, buttery flavour (a few *B. bulgaricus* and streptococci; few Gram-negative bacilli).
5. Fermenlactyl tablet = thick creamy liquid; acid flavour (large numbers of streptococci; a very few *B. bulgaricus*).
6. Rowntree chocolates (2) = whey, with some curd; cheesy odour (*B. bulgaricus* and streptococci, a few other Gram-negative and positive bacilli).

The only preparation of those examined giving anything like a satisfactory soured milk is the liquid sauerin.

Gelatine plates made from the emulsions used for determining the amount of *B. bulgaricus* present showed all the preparations to be comparatively free from extraneous organisms, though in the soured milks prepared with some of them extraneous organisms were numerous.

Bulloch[10] similarly found dry preparations very unsatisfactory.

I have also attempted to ascertain whether the ingestion of soured milk produces any diminution of lactose fermenters and of *B. welchii* in the faeces. The determinations were made on myself and on my laboratory assistant, Mr. Welch. One pint of soured milk was taken daily for a month. The method of examination was to take 1 gram of faeces, emulsify in water, and subculture various fractions into lactose bile-salt peptone water for lactose fermenters and into milk (anaërobic cultures after heating to 80° C.) for *B. welchii*. The results are given in the following summary:

CONTROLS BEFORE TREATMENT.

Bile-Salt Cultures for Lactose Fermenters.

Subject H. (June 15).—Amounts of from 0.01 mg. to 0.00001 mg. (descending by tenths and in duplicate) all gave acid and gas.

Subject W. (June 18 and 20).—Similar amounts to the foregoing on both occasions gave acid and gas in all the tubes.

In both subjects, therefore, at least 100,000,000 lactose fermenters were present per gram of faeces.

Milk Cultures for B. Welchii.

Subject H. (June 15).—*B. welchii* present in 0.01 gram, doubtfully present in 0.001 gram, not present in 0.0001 gram and 0.00001 gram of faeces.

Subject W. (June 18 and 20).—*B. welchii* present on both occasions in 0.01 gram of faeces but not in less amount.

In both subjects, therefore, *B. welchii* was present in 0.01 gram of faeces, but not in less.

DURING THE TREATMENT.

Bile-Salt Cultures for Lactose Fermenters.

Subject H.—On June 29th, amounts of 0.01 mg. and 0.001 mg. of faeces gave acid and gas, but not less amounts. On July 7th and July 21st, amounts of 0.01 mg. to 0.00001 mg. of faeces gave acid and gas.

Subject W.—On June 29th, amounts of 0.01 mg. to 0.00001 mg. of faeces gave acid and gas. On July 7th and 21st, amounts of faeces of 0.01 mg., 0.001 mg., and 0.0001 mg. gave acid and gas, but not less amounts.

Milk Cultures for B. Welchii.

Subject H.—On June 29th, *B. welchii* present in 0.1, 0.01, and 0.001 gram of faeces. On July 7th and 21st, *B. welchii* was present in 0.1 gram of faeces, but not in less.

Subject W.—On June 29th, *B. welchii* was present in 0.1 and 0.01 gram of faeces, but not in less. On July 7th, *B. welchii* was present in 0.1 gram of faeces, but not in less. On July 21st, *B. welchii* was present in 0.1, 0.01, and 0.001 gram of faeces.

From these examinations it would seem that the ingestion of soured milk for a month produces no decided change in the numbers of lactose fermenters and of *B. welchii* in the faeces.

The *B. bulgaricus* undoubtedly passes into the intestine, for after administration it can be demonstrated in the faeces in so short a time as five days after commencement of treatment (Leva[11]) and may be present in enormous numbers (Eyre[12]). According to Eyre it will cause the disappearance from the intestinal tract of abnormal organisms, such as the pathogenic streptococci and pneumococci.

As regards the diminution of the products of putrefaction in the intestine caused by the sour milk treatment, Leva (loc. cit.) found that the ethereal sulphates, volatile fatty acids, aromatic oxy-acids and hippuric acid in the urine were all diminished, but no alteration in the amount of indican excreted could be detected.

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III.—ALEXANDER BRYCE, M.D., D.P.H.Camb.,
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THE LIMITATIONS OF CURDLED MILK THERAPY.

PROBABLY the milk treatment has not been under observation sufficiently long to enable us to have defined its indications and relegate it to its true position as a therapeutic agent; but our experience of it is quite extensive enough to have determined some of its limitations. In consequence of the egregious claims made for it—for the most part by irresponsible people—curdled milk is at present in great favour with the medical profession and among the

public as a very valuable article of diet; and from this point of view, where it suits the individual, nothing but good is likely to result. Being a complete food, and as a rule easy to digest—because, as has been pointed out by Metchnikoff, 38 per cent. of its casein and 68 per cent. of its phosphate of calcium have been rendered soluble by the fermentation process—being also a powerful diuretic, occasionally a convenient laxative, and it is claimed a nervine tonic, it cannot fail to produce a potent influence for good on the human body.

It is even averred that its contained lactic acid increases the coefficient of the assimilation of food in the intestine, because Biernacki[1] has shown that lacto-bacilline causes a diminution of the weight of the faeces amounting to from 15 to 20 per cent. of dry matter, with in addition a reduction of their content of nitrogen and fat. This same observer remarks that nascent lactic acid stimulates intestinal digestion, and that lactic acid bacilli exert very energetic action on the digestive organs, and so improve digestion. This effect he suspects is due to the stimulation of the secretions, which would explain the notable intolerance of the subjects of hyperacidity for soured milk. He also asserts that soured milk is astringent in certain diseased conditions of the intestine, although lacto-bacilline produces the opposite effect in constipation.

Amidst an almost universal chorus of approval, this is one of the few dissentient voices which have raised a note of warning in the use of curdled milk, and it is to be observed that the evidence is somewhat contradictory. Curdled milk disagrees with the hyperchlorhydric patient because it stimulates the secretions. One would, therefore, have expected that on account of an analogous action on the intestinal secretions it would have relieved constipation, whereas an astringent effect was noted. Personally, I can cordially corroborate both statements, because I have repeatedly observed that curdled milk always disagrees with hyperchlorhydrics and almost always produces constipation, and I have only known of a very few cases in which it acted as a laxative. The two objections to its use, indeed, which the healthy member of the community who has been infected by the craze advances are, that it induces obesity and constipation—both well-known effects of the consumption of ordinary milk. I am informed by the superintendent of a large sanitarium in this country, who is enthusiastic in the use of curdled milk, that he has never known it to act as a laxative, although on the other hand he does not consider it is any more constipating than ordinary fresh milk. It is a fact worth noting that not only does the average hyperchlorhydric patient tolerate fresh milk, but he finds it distinctly advantageous if used in sufficient quantity because of its power to combine with the excess of acid present. As the majority of dyspeptics belong to this order, it will be found that curdled milk is likely to aggravate their malady, whereas in most instances they can not only tolerate but benefit by the use of fresh milk. Even where a patient is not decidedly hyperchlorhydric he may be just on the border line, and any little increase of acidity, such as would be due to the curdled milk, would produce acid dyspepsia. This, therefore, is the first contraindication of curdled milk.

In the second place, it will be found that in by far the greater proportion of cases in which it is administered it will induce constipation just in the same degree as fresh milk. It must never be forgotten that milk contains more lime than lime water which is deliberately used for its astringent effect, and although it is claimed that in curdled milk the phosphate of calcium has been rendered more soluble, this fact has apparently no influence in reducing the constipating tendency. In my opinion this is a most important and weighty objection to its use, as in many cases it would induce the very contingency it is supposed to counteract — namely, auto-intoxication, which in ordinary circumstances need hardly be feared where a daily alvine evacuation can be secured.

Perhaps the most serious indictment in connexion with its use is the undoubted fact that it induces or initiates rheumatism; and I should like to draw attention to this fact on account of the many cases in which I have seen it produce this effect. In the days of my youth I had frequent opportunities of testing the value of buttermilk, both as a refreshing drink and a dietetic agency with oatmeal porridge, but its use was invariably accompanied by severe indigestion. In more recent years I have suffered both from colic and indigestion from the use of curdled milk, and therefore did not persevere in its use. On my return from Battle Creek Sanitarium in 1909 I determined to make a persistent attempt to habituate myself to, and if possible benefit by, its use, and although by employing yoghurt tablets or capsules I was able to obviate the indigestion, I repeatedly noticed after a few days—generally the third or fourth day—an exacerbation of a rheumatic pain in my right knee, so severe as to prevent me playing golf. That the pain was not imaginary or produced by suggestion was obvious from the fact that two or three times when I began to take the tablets in an effort to use them up whilst still active, and entirely forgetful of my previous experience, on the third or fourth day I was again pulled up by the rheumatism. This induced me to watch other cases, and I have been able to note lumbago, sciatica, attacks of muscular rheumatism in various parts of the body, and an occasional effusion into a joint. One gentleman well up in years became so seriously ill from fibrositis—a new experience in his career—that he was compelled to spend the winter at Bath, and is only now recovering from the effects of his unlucky adventure with curdled milk. Another gentleman who had always had a tendency to constipation adhered to the treatment in the belief that it would cure his constipation, but abandoned it when he became convinced that it had aggravated the condition and left him with a severe attack of lumbago.

Most physicians are in the habit of counselling their rheumatic patients to keep free from even the slightest suspicion of constipation, knowing from experience how quickly this induces sciatica, lumbago, and fibrositis, and doubtless the constipating tendency of milk has something to do with these untoward results. But there is another factor in the case which is probably of more importance. For many years excess of acidity has been considered as being in some way associated with the production of rheumatism, and lactic acid itself has been mentioned as the specific agent involved.

In the ordinary way it is discovered in the body as one result of indigestion, and also from the metabolic changes in muscles. We also know that ammonium is a product of protein metabolism, and these two substances being carried by the blood to the liver combine to form lactate of ammonium, $NH_3 + C_3H_6O_3 = NH_4C_3H_5O_3$, and this in ordinary circumstances is converted into urea. Now in birds the liver forms uric acid, and when it is cut out of the circulation lactate of ammonium is excreted instead of uric acid. It would therefore appear that, at any rate in birds, the liver transforms lactate of ammonium into uric acid.

The close association of uric acid, urea, and lactic acid is surely more than a mere coincidence. The molecule of uric acid contains two molecules of urea combined with an acid containing three atoms of carbon—namely, acrylic acid, which is simply dehydrated ethylidene lactic acid. Uric acid, indeed, has been synthesized by Horbaczewski from trichlorlactic acid and urea.

I make no claim for the recognition of lactic acid as a direct factor in the production of rheumatism—this was sufficiently disproved by Latham in the Croonian lectures of 1886—but I do think that in common with many other acids it is an indirect factor.

Now when excessive quantities of lactic acid are formed by fermentation in the alimentary canal, or by feeding with lactic acid bacilli, there is no doubt that these can be absorbed, and it is conceivable that they may interfere in some way with the normal hepatic metabolism. In any case the constant necessity for neutralizing the ever-increasing acid contents of the bowel tends to withdraw alkalis from the system, and lessens the alkaline reaction of the blood, a condition analogous to that which occurs when too much acid fruit is consumed. I have repeatedly seen arthritis produced by indulgence in a dish like stewed rhubarb or stewed plums, and whatever the explanation may be, it is closely bound up with the ingestion of more acid than the system can tolerate. The function of the kidneys is to eliminate excess of acid from the alkaline blood, and if they fail in this duty then autointoxication must arise, because the blood is not alkaline enough to absorb carbon dioxide from the tissues.

It should be carefully noted that curdled milk was introduced by Metchnikoff and his associates less as an addition to our therapeutical armamentarium than as an

item of our daily diet, and from this point of view it may be considered as a most powerful argument in favour of a low protein diet. If harmful putrefactive organisms only infect the colon when there is a food supply for them in the shape of surplus protein not required by the tissues, then the simplest way to exterminate them is to desist from taking the extra protein. It is surely a work of supererogation, and certainly a waste of energy, to consume the useless extra protein calculated to form dangerous toxins, and at the same time swallow a by no means delectable antidote in the shape of a culture of lactic acid bacilli. But it has yet to be proved that the toxins, which are undoubtedly formed, are, except when in excess, or where the natural protective organs are unable satisfactorily to fulfil their function, any more dangerous than the irritating acids formed by the antitoxin, and it should be noted that butyric acid bacteria are anaërobic.

It should be borne in mind that lactic acid therapy is only indicated when the putrefactive anaërobic micro-organisms are in excess in the colon, and there is no guarantee that without such a guide this form of medication may not aggravate rather than alleviate the intestinal condition. It is not at all unusual for severe colic and occasionally diarrhoea to arise during a course of curdled milk treatment, and although such untoward symptoms may be anticipated just at the beginning in many cases, they do not always subside. It would be futile for me to deny the benefit frequently accruing during the treatment, but in many cases of colitis I have seen just as valuable results from fresh cow's milk, when it agreed with the patient, as from the curdled milk.

We are very apt to forget that there are other factors in the curdled milk treatment besides the lactic acid bacillus. Milk *per se* is a most valuable nutrient, and the new system is an excellent artifice for enabling recalcitrant patients who object to ordinary milk to obtain the unquestionable advantages of the continued use of milk. Nor is it to be forgotten that it replaces the objectionable tea and coffee, which in most cases of intestinal ailments are decided irritants and always nerve poisons in the neuro-arthritic type of patient. At the same time it diminishes the desire for flesh foods because it possesses quite a respectable amount of protein.

The longevity of the Bulgarian peasantry is not necessarily due to the use of soured milk. There are many other powerful factors in operation. The most important of these is an open-air life with considerable muscular exercise, extreme moderation and simplicity of diet, absence of the nerve-exhausting occupations of civilized life, and the influence of heredity—an element whose potency must not be overlooked.

But is it quite certain that curdled milk is used with such frequency or in such proportions in Bulgaria as is being so constantly reported? My friend, Mr. Frank Marsh, F.R.C.S., of Birmingham, who resided for eight months in a Bulgarian peasant's cottage, never once saw nor heard of curdled milk whilst there, although he recollects that much fresh cow's milk was used, and naïvely adds that he saw more tuberculosis amongst the people than he has ever seen since that time.

It has been asserted[2] that intestinal putrefaction paves the way for intestinal infection, because putrefactive bacteria prepare the soil for the growth of pathogenic bacteria, and this has been used as an argument in favour of a pure vegetarian diet, eggs, cheese, and cow's milk being rejected because capable of encouraging the growth of dangerous microbes. Vegetable albumen is said to be less putrefiable than flesh proteins, and possesses the further advantages that it is always accompanied by at least three times its weight of carbohydrates. As, however, much of this is in the form of cellulose, which succeeds in preventing quite two-fifths of the protein from being assimilated, the advantage is a very questionable one. A remarkable commentary on this statement which is bolstered up by concrete facts exists in the practice of vegetarians taking large quantities of curdled milk. This, at any rate, is the custom at Battle Creek Sanitarium, and one cannot help feeling surprised that with a low protein diet prepared in such a way that it is stated there is no surplus of non-putrefiable vegetable albumen, there can be any necessity for the use of any means to neutralize the toxins of putrefactive organisms which have no obvious cause for existence.

The observations of Professor Walker Hall[3] and Dr. W. A. Smith are not without significance in this connexion. After a careful investigation they came to the conclusion that many of the tablets used in preparing curdled milk were of no real value, and that the amount of the curd produced was by no means an index of the capacity of the active organisms to pass through the alimentary canal. There is no doubt that in many cases much of the benefit ascribed to the curdled milk must have been owing entirely to the use of milk as such, and incidentally the reduction or exclusion of more harmful liquids. Considerable dubiety must therefore exist as to the beneficial therapeutical influence of lactic acid bacilli, and it has been well summed up by Mendel[4] in these words: "The usefulness of lactic acid, sour milk, and lactic acid ferments as curative agents is nothing less than problematical at the present moment."

But whatever difference of opinion may be expressed on this point, it is absolutely certain that there is no indication for the indiscriminate and widespread use of curdled milk as a therapeutic agency. If the practice of moderation in eating be the keynote of the whole life, if a daily alvine evacuation be the rule—and this is by no means the prerogative of vegetarians—then we can afford to despise the much advertised ravages of the putrefactive organisms in the colon.

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THE INFLUENCE OF SOUR MILK ON METABOLISM.

The treatment of intestinal and other complaints by giving sour milk is supposed by some to cause various degrees of benefit to the patient beyond those which are obtained by psychological effects. The only influence which sour milk could have from a physiological point of view would be that the sour milk might cause a better absorption of the food or that the lactic acid bacilli flourishing in the intestine at the expense of the bacteria ordinarily there, would lead to the production of either less putrid products, or harmless products, and so benefit the individual. Increase of the bacteria normally present in the bowel under ordinary circumstances can lead to two pathological conditions—either increased intestinal fermentation where the breaking down of the carbohydrates causes an increased production of gas and various organic acids, or the bacteria may cause increased intestinal putrefaction by acting on the proteids contained in the intestine.

The addition of lactic acid bacteria to the bowel contents already indicating increased intestinal fermentation would hardly produce any great advantage; but on the other hand, in cases where increased intestinal putrefaction is going on, the addition of lactic acid bacilli might, by their multiplication, stop the increased intestinal putrefaction. In this paper I am only going to deal with the addition of small quantities of sour milk to an ordinary diet, such as in most cases would be given in practice.

Increased intestinal putrefaction can be partly recognized by the fact that in marked cases one gets an increase in the aromatic sulphates in the urine, together with, as a rule, a great increase in the quantity of indican. Some go so far as to say that when one obtains an increased reaction of indican, one may consider that the person is suffering from increased intestinal putrefaction. In the case of a great many individuals, especially the meat-eating ones, it is found that an excess of indican is present in their urine, even when one can hardly consider the condition worthy of designating as pathological increased intestinal putrefaction. The aromatic sulphates may be only slightly increased, as in the cases taken for the present paper, and yet marked intestinal putrefaction be present.

The examination of the faeces, then, seems to be a better indication of increased intestinal putrefaction. In

these cases, instead of the neutral faeces ordinarily passed, one finds a distinctly alkaline stool, which on keeping becomes more alkaline. This is due to the fact that in the splitting up of the proteids ammonia is formed, which neutralizes any acids which may be produced in the stool, and so causes the faeces to react alkaline. The increased putrefaction as against fermentation in the bowel is also demonstrated when one employ's Schmidt's fermentation test; with this method one obtains little or no gas formation, while in increased intestinal fermentation one finds a very marked formation of gas in the tubes kept in the incubator for twenty-four hours.

The difficulty in carrying out metabolism experiments where one is comparing daily analyses—as all those who have tried it are aware—is almost insurmountable, unless the patient is kept daily under exactly similar conditions. Three cases which I am going to describe were, however, kept entirely in bed undergoing a so-called rest cure; the amount of exercise they took daily was kept practically equal, each of them having massage for two hours daily; for the entire period they lived a life of routine, the hours being almost the same for reading and working, so that they were as little interfered with by the ordinary worries of life as possible.

The difficulties of collecting faeces and urine are great, but in these three people it was accomplished without failure. It is marvellous how many people supposed to be under strict observation, with everything explained to them, will nevertheless, in spite of all this, either mix their urine with their faeces or do some other stupid thing. One has also the difficulty of carrying out the multitudes of analyses which are necessary in doing these experiments.

The patients were first put on Schmidt's diet[1] for a period of some two to three days, and then on ordinary mixed diet for two to five days; this was followed by the same mixed diet, but some of the milk was replaced by 1 pint of sour milk given three times daily. The sour milk employed was bacteriologically examined for me by Dr. Kenneth Goadby, who found that it contained the Bulgarian bacillus and no other organisms except those concerned in milk clotting.

The different periods were separated from one another by charcoal being given at eight o'clock in the morning at the commencement of a period, and again at the termination. By this means the total quantity of faeces passed between the two administrations of charcoal could be distinctly isolated for the purpose of analysis. Schmidt's diet was given first so as to find out the condition of the bowels, and whether intestinal putrefaction was really present, as I have found by experience that it is extremely difficult to obtain satisfactory results with the fermentation tubes on an ordinary mixed diet, while with Schmidt's diet the results are much more conclusive. It is not advisable, however, to continue Schmidt's diet for a long period, because the patients are generally averse to taking it, and it would not be comparing an ordinary condition of affairs by adding sour milk to this diet.

The first case (Table I) was that of a lady who suffered from a certain amount of intestinal discomfort, but no organic disease. For two days she was put on Schmidt's diet, the first Schmidt's faeces appearing two hours after commencing the diet; and since, as a rule, the patient only passed one stool daily, one must consider that the increased motor power of the alimentary tract was due to psychological causes.

The ordinary examination of the urine showed an increased quantity of indican, with a fairly copious sediment which consisted of a few large yellow-stained uric acid crystals and numerous urates, but nothing else abnormal.

TABLE I.

Schmidt's Diet contained 16·99 Grams of Nitrogen, 94·81 Grams of Fat, 165.13 Grams of Carbohydrates, 1,540 c.cm. of Fluid; 26 Calories per Kilo.

URINE.								FAECES.						
Date.	Weight in Kilos.	Quantity.	Sp. Gr.	Nitrogen in Grams.	Sulphates.			Date.	Quantity in Grams.	Water per Cent.	Nitrogen.		Fat.	
					Alkaline A.	Aromatic B.	Ratio A : B				Grams	Absorption per Cent.	Grams	Absorption per Cent.
1910.								1910.						
Feb. 2 ...	78.20	1,460	1018	16 88	2 65	0 19	14 : 1	Feb. 2 ...	101	69.4	1 11	93	6.33	93
Feb. 3 ...	78 20	1,300	1020	18 13	2.75	0.18	14 : 1	Feb. 3-4...	145	76.4	1 23	93	7.01	93
Average ...	78 20	1 380	1019	17.36	2.70	0.19	14 : 1	Average...	123	72.9	1.17	93	6.67	93
Mixed Diet contained 22.55 Grams of Nitrogen, 117.89 Grams of Fat, 159.41 Grams of Carbohydrates, 2,240 c.cm. of Fluid; 30 Calories per Kilo.														
Feb. 5 ...	78.20	1,230	1023	15.69	5.33	0.12	21 : 1	Feb. 5-6...	221	80.4	1.69	93	5.86	95
Feb. 6 ...	78.30	1,260	1025	16.60	3.18	0.20	16 : 1	Feb. 7 ...	157	82.0	1.10	95	4.98	96
Feb. 7 ...	78 40	1,760	1020	18 57	3 47	0.21	16 : 1	Feb. 8 ...	143	78 6	1.19	95	5 33	95
Average ...	78.30	1,417	1023	16 95	3.99	0 19	18 : 1	Average...	174	80 3	1 33	94	5.41	95
Mixed Diet and Sour Milk contained 22.55 Grams of Nitrogen, 117.89 Grams of Fat, 164.81 Grams of Carbohydrates, 2,240 c.cm. of Fluid; 29 Calories per Kilo.														
Feb. 8 ...	78 80	1,400	1022	17.71	3.19	0.16	19 : 1	Feb. 9 ...	128	75.0	1.44	94	6 74	94
Feb. 9 ...	78.60	1,730	1020	19.45	3.73	0 20	18 : 1	Feb. 10 ...	135	76 0	1.46	94	6 83	94
Feb. 10 ...	78 90	1,570	1021	18.08	3.47	0.17	20 : 1	Feb. 11 ...	138	75.0	1.55	93	7.27	94
Average ...	78.77	1,613	1021	18.25	3.46	0.18	19 : 1	Average ..	134	75 0	1.48	94	6 95	94
Mixed Diet and Sour Milk contained 22.55 Grams of Nitrogen, 117.89 Grams of Fat, 164.81 Grams of Carbohydrates, 2,240 c cm. of Fluid; 29 Calories per Kilo.														
Feb. 21 ...	80 00	1,460	1021	15 36	3 25	0.15	21 : 1	Feb. 22 ...	288	72 0	2.87	87	9 36	92
Feb. 22 ...	80 20	1,850	1022	20 05	3 98	0 23	17 : 1	Feb. 23 ...	125	74.6	1.47	94	4 80	96
Feb. 23 ...	80 20	1,460	1022	16.35	3.25	0 13	25 : 1	Feb. 24 ...	157	78 6	1.51	93	4.99	96
Feb. 24 ...	79.90	1,900	1020	21.28	3.93	0.21	18 : 1	Feb. 25 ...	156	77.0	1.62	93	5 26	96
Average ...	80 08	1,668	1021	18.26	3 60	0 18	20 : 2	Average...	167	75.5	1 87	92	6.10	95

The qualitative analysis of the stools showed a fairly formed motion, with a few hard scybalae and some excess of mucus; the stools were slightly offensive and distinctly alkaline in reaction. No blood or pus was present, although there was a trace of albumen and a marked excess of urobilin. There were three stools passed while on the diet, and each of these from being alkaline became neutral, and on one occasion faintly acid, in Schmidt's fermentation tubes. On the occasion when a faintly acid stool was obtained one-tenth volume of gas was yielded; on the other occasion no gas bubbles at all were formed.

The microscopic examination of the stools showed a few undigested muscle fibres, together with some Nothnagel's yellow bodies, starch granules, fat globules, together with vegetable cells. A few leucocytes were present, with some epithelial cells, but not enough to make one consider this to be a case of catarrhal colitis. Ammonio-magnesium-phosphate crystals were also present.

During the two days the diet contained 16.99 grams of nitrogen, and there were passed in the urine no less than 17.36 grams of nitrogen on an average for the two days. The quantity of alkaline sulphates in the urine was practically normal, being 2 70 grams per diem, while the aromatic sulphates were 0 19 gram, which is slightly high for a patient on Schmidt's diet.

A quantitative analysis of the faeces showed the stool to be very dry, since it contained only an average of 72.9 per cent. of water; the stool was fairly bulky, the average for the two days being no less than 123 grams. In Table IV the averages found in a series of cases by Dr. Goodbody and myself are given for comparison. The nitrogen in the stools was 1 17 grams, which is more than one would expect, giving an absorption of only 93 per cent. proteid. The fat in the stools was 6.67 grams, yielding also an absorption of 93 per cent., so that the fat in this case was markedly increased in the faeces.

The patient was now put during a period of three days on an ordinary mixed diet. The qualitative analysis of the urine showed the same results as on Schmidt's diet, and as far as the faeces were concerned, the stools were always alkaline on being collected, while on being kept they became either neutral or faintly acid, and on one day gave one-fifth volume of gas, on another day one-sixth, while on the third day there was no formation of gas.

This diet contained much more proteid—22.55 grams of nitrogen, and the nitrogen excreted per diem in the urine during the three days averaged 16.95 grams. There were slight variations on the different days, there really being progressive increase in the quantity of nitrogen as seen in the table, in spite of the patient's gaining slightly in weight, owing to the increased quantity of food taken. The alkaline sulphates averaged 3.99 grams, corresponding to the increase of proteids taken; the aromatic sulphates remained the same as on Schmidt's diet, 0.19 gram per diem.

The patient passed the first stool again only two hours after taking the charcoal; when the second charcoal was given at the commencement of the fourth day, this was followed by a motion two hours afterwards. It may here be remarked that the patient imagined that the charcoal would act as a purgative, and this increased peristalsis, as already stated, may be put down to this psychological cause.

The quantity of faeces passed on this mixed diet averaged 174 grams, which is above the average, and contained 80 3 per cent. of water. The nitrogen in the stools varied very slightly, the average being 1.33 grams, giving an absorption of 94 per cent. The fat in the stools averaged 5.41 grams during the three days, giving an absorption of 95 per cent.

During the next period of three days one pint of sour milk was added to the diet, 8 oz. being taken at 8 a.m., 4 oz. at 11 a.m., and 8 oz. at 10 p.m. There was no special change in the qualitative analysis of the urine; the ordinary examination of the faeces with Schmidt's fermentation test showed on the first day an alkaline reaction, which remained alkaline, with no evolution of gas, when kept in the incubator; on the second day the faeces were alkaline, becoming faintly acid, and on the third day from being alkaline they became neutral, and on neither occasion was there any gas evolved.

The diet contained the same quantity of nitrogen, as ordinary milk had been taken out to be replaced by the sour milk, and during this time the patient passed daily in the urine 18 25 grams of nitrogen. The total quantity of alkaline sulphates, which in the previous period averaged 3.99 grams, now fell to an average of 3.46 grams, the aromatic sulphates only falling from an average of 0.19 gram to 0 18 gram per diem.

During this period with the addition of sour milk, the daily quantity of faeces passed averaged 134 grams, and only contained 75 per cent. of water. The nitrogen in the stools averaged 1.48 grams, showing a slight increase on what was found during the period of three days' diet without the addition of sour milk, the absorption being now 94 per cent. The quantity of fat also increased slightly, being now on an average 6 95 grams, with an absorption of 94 per cent.

The patient was kept on this diet with the addition of sour milk, and at the end of another fortnight another period of four days was analysed. The urine still contained excess of uric acid, and otherwise remained the same as on the previous examination. The stools, however, appeared to be less offensive, although still of a distinct alkaline reaction. With Schmidt's fermentation test, on one occasion one-seventh volume of gas was evolved, and on the other three days practically none, and the reaction of the stools at the end of Schmidt's test was neutral or faintly acid.

The first and second charcoal at this time appeared in 26 and 25½ hours respectively, and this may be due to the fact that the patient was altogether less nervous, having benefited by the rest cure, and probably did not expect the charcoal to act as a purgative.

The quantity of nitrogen in the urine now averaged 18.26 grams per diem, although the daily quantity showed considerable fluctuations. The alkaline sulphates were 3.60 grams, while the aromatic sulphates were 0.18 gram, so that the quantitative analysis of these four days almost exactly corresponds with that of the three days on the same diet two weeks earlier.

The faeces were slightly increased in quantity, being now 167 grams and only containing 75.5 per cent. of water; the small quantity of water may explain the fact of the quantity of faeces not being so much as the first period on a mixed diet. The nitrogen in the stools averaged 1.87 grams, showing an absorption of only 92 per cent. The fat averaged 6.10 grams, giving an absorption of 95 per cent.

During the period of four weeks in which the patient was under observation, the weight had gradually increased nearly two kilos, while the patient was taking in the diet about twenty-nine calories per kilo.

The next case was that of a gentleman (Table II) who was suffering from general intestinal discomfort; he was, however, an extremely nervous individual who had for some years overworked himself in business, and occasionally suffered from nervous panics, depression generally coming on at night accompanied by trembling and a fear of impending calamity. The attack was accompanied by shortness of breath and slight palpitation, although there was no increased stomach distension to account for the cardiac disturbance; on making a special effort to pull himself together the attack would end. Each attack was accompanied by polyuria; but unfortunately, in spite of having the patient under observation for six weeks, we were unable to get an analysis of the urine during an attack.

He was first put on Schmidt's diet for a period of three days. The urine showed an excess of indican, but nothing else abnormal. The stools were firm-formed motions, with occasionally some small scybalae, and an offensive odour; they contained traces of albumen and mucus, but no blood or pus, and there was a marked excess of urobilin.

On microscopically examining the faeces, a few small muscle-fibres were seen, showing cross-striation, an excess of fat with some partially digested starch granules, together with some epithelium, débris, and leucocytes. The first Schmidt's stool appeared twenty-four hours after commencing the diet, so that on this occasion the motor power of the alimentary tract was apparently normal.

The diet contained 16.59 grams of nitrogen, and during the three days on the Schmidt's diet 12.40 grams of nitrogen were excreted in the urine. The alkaline sulphates averaged 2.51 grams, while the aromatic sulphates were 0 20 gram.

The average quantity of faeces per diem was only 63 grams, which is less than one would expect, and contained 73.4 per cent. of water. The nitrogen in the stools was 0.62 gram, giving an absorption of 96 per cent., while the fat was 3.81 grams, giving an absorption of 96 per cent., so that the quantity of nitrogen and fat were decreased.

The patient was now put on an ordinary mixed diet containing 16.66 grams of nitrogen; the urine, however, only contained 12.37 grams per diem. The alkaline sulphates were 2.29 grams, the aromatic sulphates having fallen to 0.18 gram.

The quantity of stools passed per diem was now 81 grams, containing 75.1 per cent. of water. The nitrogen in the stools was 0.63 gram per diem, giving an absorption of 96 per cent., while the fat was 3.78 grams, giving an absorption of 94 per cent.

The patient was now given with this diet one pint of sour milk—6 oz. at 8 a.m., 6 oz. at 11 a.m., and 8 oz. at 10 p.m. During the next four days the nitrogen in the diet was 18.33 grams, while in the urine it was 14.25 grams. The alkaline sulphates were 2 60 grams, while the aromatic sulphates had risen so that they were now 0.21 gram. This abnormal rise when the sour milk was first given is difficult to explain; it was most marked the second day.

The average quantity of stools was 80 grams, containing 73.1 per cent. of water. The nitrogen in the stools increased to 0.80 gram, giving an absorption of 96 per cent., while the fat in the stools was 3.70 grams, giving an absorption of 95 per cent.

Two weeks later, the patient having been kept continuously on sour milk—only the food slightly altered, fourteen biscuits instead of 8 being now taken—another period of three days' analysis was gone through. During this time the patient took 18.79 grams of nitrogen in his diet, passing 14.24 grams in his urine. The quantity of alkaline sulphates was 2.35 grams, while the aromatic sulphates fell slightly, being now only 0.18 gram.

The quantity of faeces during this period increased considerably to 128 grams, containing 81.6 per cent. of water, while the nitrogen in the faeces was 0.92 gram, giving an absorption of 94 per cent. The fat in the stools was 3.12 grams, giving an absorption of 97 per cent. During the periods on mixed diet the charcoal took forty-seven to forty-eight and a half hours to appear in the faeces, there being no indication of increased peristalsis with the sour milk.

During the time that the patient was taking the sour milk, he went up very slightly in weight—barely 1 kilo—although he was taking from 23 to 29 calories per kilo. He thought, however, that his bowels acted with greater freedom, and that he had less discomfort from flatulence while on the sour milk.

Table II.

Schmidt's Diet contained 16.59 Grams of Nitrogen; 94.45 Grams of Fat; 147.13 Grams of Carbohydrates; 1,750 c.cm. of Fluid; 29 Calories per Kilo.

Urine.								Faeces.						
Date.	Weight in Kilos.	Quantity.	Sp. Gr.	Nitrogen in Grams.	Sulphates.			Date.	Quantity in Grams.	Water per Cent.	Nitrogen.		Fat.	
					Alkaline A.	Aromatic B.	Ratio A : B.				Grams.	Absorption per Cent.	Grams.	Absorption per Cent.
1909.								1910.						
Oct. 28 ...	65.70	1,680	1010	10 08	2.00	0 20	10 : 1	Oct. 29 ...	36	73.3	0 37	98	1.96	98
Oct. 29 ...	65.50	1,620	1016	13.28	2 58	0 21	12 : 1	Oct. 30 ...	31	73 9	0 31	98	1.64	98
Oct. 30 ...	65.50	1,510	1014	12.84	2.94	0.20	14 : 1	Oct. 31 ...	123	72.9	1.17	93	7 84	92
Average ...	65.57	1,603	1013	12.40	2.51	0 20	12 : 1	Average...	63	73.4	0.62	96	3.81	96
Mixed Diet contained 16.66 Grams of Nitrogen; 58.58 Grams of Fat; 102 07 Grams of Carbohydrates; 1,710 c.cm. of Fluid; 23 Calories per Kilo.														
Oct. 31 ...	65.30	1,280	1016	11 52	2 18	0 18	12 : 1	Oct. 31 / Nov. 1 ...	96	79.9	0 60	96	3.79	94
Nov. 1 ...	65.30	1,340	1017	13 53	2.49	0 16	15 : 1	Nov. 2-3...	84	75.3	0.64	96	4 02	93
Nov. 2 ...	65.60	1,290	1014	10.71	1 88	0 15	12 : 1	Nov. 4 ...	43	69.7	0.40	98	2.52	96
Nov. 3 ...	65.30	1,460	1017	13.72	2.60	0 23	11 : 1	Nov. 5 ...	101	75.4	0 87	95	4 80	92
Average ...	65.38	1,343	1016	12.37	2,29	0.18	12 : 1	Average...	81	75.1	0.63	96	3.78	94
Mixed Diet with Sour Milk contained 18 33 Grams of Nitrogen: 70.67 Grams of Fat; 112.08 Grams of Carbohydrates; 1,790 c.cm. of Fluid; 24 Calories per Kilo.														
Nov. 4 ...	65.60	1,790	1016	14.99	2.65	0.18	14 : 1	Nov. 6 ...	133	70.0	1 48	92	6.71	91
Nov. 5 ...	65.50	1,400	1020	16.24	3 07	0 28	11 : 1	Nov. 7 ...	73	72.3	0 74	96	3.67	95
Nov. 6 ...	65 50	1,400	1017	13.17	2.40	0 20	12 : 1	Nov. 8 ...	65	77 5	0.49	97	2.18	97
Nov. 7 ...	65.40	1,340	1017	12.61	2.27	0.20	11 : 1	Nov. 9 ...	49	72 2	0 50	97	2 22	97
Average ...	65.50	1,483	1018	14.25	2.60	0.21	12 : 1	Average...	80	73.1	0.80	96	3.70	95
Mixed Diet with Sour Milk contained 18.79 Grams of Nitrogen: 93.43 Grams of Fat; 145.10 Grams of Carbohydrates; 1,988 c.cm. of Fluid; 28 Calories per Kilo.														
Nov. 22 ...	66.60	1,680	1019	16 02	2.11	0 17	12 : 1	Nov. 24 ...	159	82 0	1.15	93	3 89	96
Nov. 23 ...	66.50	1,310	1020	12.86	2.25	0.16	14 : 1	Nov. 25 ...	64	79.8	0.52	97	1.75	98
Nov. 24 ...	66.60	1,340	1019	13.83	2.70	0.22	11 : 1	Nov. 26 ...	162	83.1	1.10	94	3.73	96
Average ...	66.56	1,443	1019	14.24	2 35	0.18	13 : 1	Average...	128	81.6	0.92	94	3 12	97

The third case was that of a lady (Table III), who had suffered from chronic constipation for years, and was extremely thin. In this case, in order to get the bowels to act, it was necessary to give her pil. col. et. hyos., gr. 4, every night. During the period of three days that she was on Schmidt's diet the urine contained an excess of indican with a faint trace of albumen, but otherwise nothing abnormal. The stools were formed principally of scybalae massed together in rolls with a good deal of mucus attached to them; the odour was offensive, a small quantity of blood being often present; there was a marked excess of mucus, albumen, and urobilin. Even while taking the pill the food took fifty-one and a half hours to pass along the alimentary tract.

The Schmidt's fermentation test gave a distinct alkaline reaction of the faeces, which gradually became neutral, and there were a few bubbles only of gas

The diet contained 15.59 grams of nitrogen, and the urine only 8.41 grams of nitrogen. The alkaline sulphates were 1.60 grams, with 0.19 grams of aromatic sulphates. The quantity of stools per diem averaged 103 grams, and, in spite of taking the pills, there was only 64.9 per cent. of water. The nitrogen in the stools averaged 1.25 grams, giving an absorption of only 92 per cent. The fat in the faeces was very large, being no less than 9.42 grams, the absorption being as low as 90 per cent.

During the next period of six days the patient was put on a mixed diet; the period had to be extended to six days, as the first charcoal took seventy-four and three-quarter hours to appear, in spite of the patient passing a motion each day. The stools were not so firm this time, although they contained some scybalae and a good deal of mucus, sometimes tinged with blood.

The Schmidt's fermentation test on this mixed diet yielded an alkaline stool, which remained alkaline, and no gas was given off on any occasion.

The diet only contained 12.37 grams of nitrogen, the patient being a very small feeder, and it was with the greatest difficulty that one got her to take the quantity she did. The urine now contained 11.29 grams of nitrogen. The alkaline sulphates were 2.13 grams per diem, the aromatic sulphates having fallen to 0.14 gram.

The total quantity of stools averaged 63 grams, containing 79.4 per cent. of water. The nitrogen in the stools was 0.67 gram, giving an absorption of 95 per cent. The fat in the stools was 2.68 grams, giving an absorption of 93 per cent.

During the next period of four days the patient took with the food 1 pint of sour milk, 8 oz. at 8 a.m., 4 oz. at 11 a.m., and 8 oz. at 10 p.m. The diet now contained 14 87 grams of nitrogen, and there was found in the urine 11.90 grams of nitrogen. The alkaline sulphates averaged 2.32 grams, while the aromatic sulphates fell to 0 12 gram.

During this period the quantity of faeces increased to 118 grams per diem, containing 81.4 per cent. of water. Charcoal now appeared with the faeces after fifty-five and a half hours, and the stools were inclined to be unformed paste, no longer containing any scybalae.

The daily quantity of nitrogen in the stools was 1.09 grams, giving an absorption of 93 per cent. The fat was 3.80 grams per diem, giving an absorption of 94 per cent.

Unfortunately this patient could not be analysed at a later period, as the difficulties of getting her to take her meals fully could not be overcome with sufficient accuracy to make the results reliable.

The conclusions to be drawn from these analyses on metabolism when a small quantity of sour milk is given in addition to the ordinary mixed diet can be placed under two heads:

TABLE III.

Schmidt's Diet contained 15.59 Grams of Nitrogen; 92.68 Grams of Fat; 188.01 Grams of Carbohydrates; 1,540 c.cm. of Fluid 42 Calories per Kilo.

Date.	Weigh in Kilos	Quantity.	Sp. Gr.	Nitrogen in Grams.	Sulphates. Alkaline A.	Aromatic B.	Ratio A : B	Date.	Quantity in Grams.	Water per Cent.	Nitrogen. Grams.	Nitrogen. Absorption per Cent.	Fat. Grams.	Fat. Absorption per Cent.
1910. Feb. 16 ...	48.40	1,930	1014	8.32	1.42	0.22	6 : 1	1910. Feb. 18 ...	159	69.0	1.77	89	13.44	86
Feb. 17 ...	48.60	1,960	1011	9.87	2.02	0.20	10 : 1	Feb. 22 ...	16	61.7	0.23	99	1.72	98
Feb. 18 ...	48 10	1,370	1012	7.04	1 35	0.15	9 : 1	Feb. 23 ...	134	63.9	1.74	89	13.09	86
Average ...	48 37	1,753	1012	8 41	1 60	0.19	8 : 1	Average...	103	64.9	1.25	92	9.42	90

Mixed Diet contained 12.37 Grams of Nitrogen; 39.85 Grams of Fat; 73.09 Grams of Carbohydrates; 1,288 c.cm. of Fluid; 21 Calories per Kilo.

Feb. 20 ...	4.710	1,000	1018	10.46	2.04	0.16	12 : 1	Feb. 23	—	72.0	0.46	96	1.81	95
Feb. 21 ...	47.10	1,460	1016	15.58	2.76	0 19	14 : 1		99	72.0	0.46	96	1.81	95
Feb. 22 ...	47.10	840	1019	9.74	2.35	0.10	23 : 1	Feb. 24 ...	138	68.6	2.21	82	8 82	78
Feb. 23 ...	47 90	1,120	1011	6 48	1.11	0.11	10 : 1	Feb. 25	—	86.0	0.33	97	1.33	97
Feb. 24 ...	47.00	1 350	1014	15.15	2.49	0 16	15 : 1		92	86.0	0.33	97	1,33	97
Feb. 25 ...	46 90	1,200	1014	10.32	2,04	0.13	15 : 1	Feb. 26 ...	59	92.0	0.24	98	0.96	98
Average ...	47.18	1,028	1015	11.29	2.13	0.14	15 : 1	Average ...	63	79.4	0.67	95	2.68	93

Mixed Diet and Sour Milk contained 14.87 Grams of Nitrogen; 59.95 Grams of Fat; 91.74 Grams of Carbohydrates; 1,400 c.cm. of Fluid; 28 Calories per Kilo.

Feb. 26 ...	47.00	1,300	1015	10 17	3.32	0.11	30 : 1	Feb. 28	—	81.0	1.60	89	5 65	91
Feb. 27 ...	47.30	960	1025	13.45	1 34	0.13	10 : 1		343	81.0	1.60	89	5.65	91
Feb. 28 ...	46.90	1,290	1015	12.50	2.29	0 12	19 : 1	March 1...	69	86.7	0.45	97	1.59	97
March 1 ...	47.00	800	1025	11.50	2.32	0.12	19 : 1	March 2...	61	77.0	0.69	95	2.43	96
Average ...	47.05	1,088	1020	11.90	2 32	0 12	19 : 1	Average...	118	81.4	1 03	93	3.80	94

First, *the influence on increased intestinal putrefaction.* The quantity of the aromatic sulphates is seen to be decreased, although this is not in any considerable quantity, but in none of the cases were the aromatic sulphates very large to commence with. The increased indican in the urine also appeared to be somewhat decreased in quantity.

In all the cases the stools became much less offensive in odour when a small quantity of sour milk had been added to the diet. The results of Schmidt's fermentation test further indicated a decrease in the intestinal putrefaction, and the marked alkaline condition of the stools tended to become either neutral or even acid.

The chemical analyses gave indications that there was a decrease in the intestinal putrefaction.

Secondly, *the influence on the absorption of food.* In Table IV the results of a series of analyses on individuals on Schmidt's diet and on ordinary mixed diet are given. These can be taken as a standard of comparison.[2]

TABLE IV.

Average Analysis of Faeces on Schmidt's Diet.

Quantity in Grams.	Water per Cent.	Nitrogen. Grams.	Nitrogen. Absorption.	Fat. Grams.	Fat. Absorption.
90	76	0 88	Per Cent. 95	4.26	Per Cent. 96

Average Analysis of Faeces on Mixed Diet and 1½ Pints of Milk.

Quantity in Grams.	Water per Cent.	Nitrogen. Grams.	Nitrogen. Absorption.	Fat. Grams.	Fat. Absorption.
117	75	1.11	Per Cent. 94	3.75	Per Cent. 96

The quantity of nitrogen n the stools is certainly increased by the addition of sour milk to the diet, and this increase in the quantity of nitrogen present causes the apparent decrease in the absorption of nitrogen by the bowel. It must here be remembered that the nitrogen contained in the stools is not really the nitrogen in the food, which remains undigested; but is the nitrogen contained in the various secretions that are eliminated into the bowel, together with mucus, epithelial cells, and the remains of numerous bacteria in the intestine; so that, although the nitrogen absorption may apparently be decreased, there is in all probability no real decrease in the absorption of nitrogen.

The fat, however, in the stools, appears to be slightly increased in quantity in two of the cases, while in Table II there was an apparent decrease in the quantity of fat.

The analytical results of the absorption of food after the addition of small quantities of sour milk to an ordinary diet do not apparently point to any better absorption of food.

I have to thank Mr. Lawrence for having so carefully carried out the analyses, and Dr. Goodbody for having gone through all the numerous figures necessary for making these tables.

REFERENCES.

[1] Schmidt's Diet, p. 95. Harley and Goodbody, *The Chemical Investigation of Gastric and Intestinal Diseases.* [2] Ibid., pp. 101, 102; 123, 124; 134, 136; 148, 146.

DISCUSSION.

Professor SAHLI (Berne) said the claims made for sour milk as compared with ordinary milk tended to be exaggerated. It must, however, be admitted that sour milk had advantages in certain directions. The sour milk had proved of particular advantage in the medical clinic at Berne in cases of gastric anacidity, including that which was associated with pernicious anaemia, as this disease perhaps depended upon deficient absorption of the iron of the food as a result of gastric hypo-acidity; consequently, the absorption of the iron of the food, and also iron given as medicine, could be increased by the administration of sour milk or lactic acid. In addition, sour milk had been used in the Berne clinic for enteritis and typhoid fever. It was also useful in diabetes mellitus, as in the process of souring the sugar of milk was reduced to about half. As the action of sour milk in digestive disorders depended upon its preformed lactic acid, the administration of the

ferment alone could take its place. Faecal examinations showed that there could be no question of an extensive growth of lactic acid organisms in the intestine. With regard to the bacteriology of sour milk, as it had been described that day, the speaker was very sceptical. He was of the opinion that the bacteriology of the milk was the same all over the world, and that the *B. bulgaricus* had not been separated as a definite species from other organisms. The description of the organism in this connexion was insufficiently clear.

Dr. F. D. Bond (Gloucester) desired to put in a plea on behalf of whey as a better medium for the administration of the lactic acid treatment than milk, because the complicating influence of the casein was eliminated, and the therapeutic problem was thereby much simplified. Apart altogether from the lactic acid, which could be generated as easily in whey as in milk, whey had special recommendations in the fact that its administration could be pushed to a much greater extent without fear of creating digestive troubles than milk could be. Dr. Bond stated that he could speak from personal experience of the beneficial effect of sour whey in promoting an increased capacity for work. He believed this to be due to a distinct tonic influence which sour whey exercised on the heart. He urged those who were interested in working out carefully the real therapeutic value of lactic acid to do so by testing on their own persons the effects of whey in different degrees of sourness.

Dr. R. Hutchison (London) expressed himself as profoundly sceptical of the scientific basis of a treatment which had been exalted into a sort of craze. The benefits claimed for it by different speakers could be obtained by simpler and better controlled means. For example, to produce intestinal antisepsis he would prefer calomel, and in absence of gastric acidity he would rather prescribe weak hydrochloric acid.

Professor Bradbury (Cambridge) related two cases of mucous colitis which had improved upon the treatment, and a case of intestinal indigestion, complicated with severe bradycardia, which completely lost all symptoms.

Dr. A. F. Hertz (London) said that many of his patients with constipation claimed to have experienced relief from soured milk. There were cases where the treatment had been followed by very severe and intractable diarrhoea. He desired to see bacteriological examination of the faeces carried out as a routine control. Dr. Eyre, in cases of infective colitis under his care, had been able to show the disappearance of the offending organism.

NEW FACTS CONCERNING CHRYSAROBIN.

By Professor P. G. Unna, M.D.,
Hamburg.

Chrysarobin has become, notwithstanding several disagreeable accompanying effects, a world-wide remedy, as up to the present time no satisfactory substitute has been found for it. The medical man who now sees daily its action upon the skin can scarcely imagine the impression which this remedy made upon the European physicians when it was introduced thirty-five years ago. It seemed to be something absolutely new, not to be compared to any former skin remedy.

After Tarish (1878) introduced pyrogallic acid as a rival to chrysarobin and we became acquainted with a whole group of similar substances, like resorcin and ichthyol, chrysarobin lost some of its former nimbus. But in one respect it upholds its peculiar position up to the present day, as it is not only a remedy of first rank in practice, but an incomparable diagnostic test for certain qualities of the skin. For as we all know, chrysarobin is oxidized on some regions of the skin strongly, on others weakly, on some not at all. But the reason of this you will not find in any textbook of physiology or pharmacology. Could we explain this, many obscure points of dermatological work would become clear to us.

As you are aware, the nature of chrysarobin was in the beginning very much disputed. Attfield, who first examined the Goa powder more exactly, found in it 80 to 84 per cent. chrysophanic acid. But Liebermann and Seidler showed that the chrysophanic acid obtained by Attfield was developed from the Goa powder by the alcoholic solution of caustic potash used by them, and that originally Goa powder contained only a reduced chrysophanic acid, which they named "chrysarobin." They gave it the formula, $C_{30}H_{26}O_7$, and fixed the equation:

$$\underset{\text{Chrysarobin.}}{C_{30}H_{26}O_7} + 2O_2 = 3H_2O + 2\underset{\text{Chrysophanic acid.}}{(C_{15}H_{10}O_4)}.$$

From this Seidler explained the therapeutic effect of chrysarobin thus—that it kept away the oxygen of the air as a reducing agent, not only from the skin, but in parasitic skin diseases also from the parasites. Therefore he proposed to make parallel tests with chrysarobin and chrysophanic acid on one hand, and on the other to find out if other reducing agents had the same effect as chrysarobin.

The first problem I solved by comparing the chrysophanic acid gained from rhubarb with the chrysarobin from Goa powder. I found that the first was good in cases of superficial parasitic skin diseases and eczema, but proved to be devoid of the effect of chrysarobin upon psoriasis and sycosis. By this I confirmed the assertion of Liebermann and Seidler that chrysophanic acid and chrysarobin were totally different substances, and I therefore claimed a separation of them for the German *Pharmacopoeia*, as did fourteen years later Walter G. Smith for the English *Pharmacopoeia*. But as the comparison of rhubarb chrysophanic acid with chrysarobin was in some respects open to objection, I repeated later on the same experiments with a chrysophanic acid gained from Goa powder by the peroxide of soda. But this chrysophanic acid also *failed to have the powerful effect of chrysarobin.*

The second problem of finding a remedy of similar constitution and action was solved by Liebermann. Seeing the essential quality of chrysarobin in its oxidation upon the human skin, he advised the reduced leuco-products of the alizarine under the name of "anthrarobines" as remedies for skin diseases. As you know, the expectations formed for anthrarobin were not fulfilled. Now, as before, the product gained from the exotic Goa powder holds its undisputed position. For this reason alone we have ground to be sceptical in regard to the first theory of chrysarobin, according to which the true action of this remedy was regarded as due to its oxidation to chrysophanic acid.

Considering without prejudice the problem of Liebermann, we must distinguish at least three possibilities. First, chrysarobin may act *as such* upon the skin, by combining with the horny layer in some way. If this were the case all subsequent alterations of chrysarobin would be of no importance for the healing property. This supposition can, as it seems, be excluded in regard to chrysarobin; were it correct, it ought to act as well where it is changed as where no change takes place. Thus it should act upon the knees, elbows, and legs, as well as upon the face and neck. But in observing the different regions of the skin we note that it acts upon psoriasis the quickest where it changes most.

The second possibility is that the *process of oxidation*, which Liebermann made the base of his theory, is the essential point in the therapeutic effect. Without doubt *reducing qualities* of our remedies are of great importance, and these induced me many years ago (1883) to separate as a special group the *reducing remedies.*[1] But, of course, the reducing effects can only be such as are common to all reducing agents and not such as characterize some of them only. For instance, if only chrysarobin and pyrogallic acid are able to remove psoriasis and not the other reducing agents, the curative effect cannot, or cannot alone, depend on the oxidation of these substances upon the skin; besides, it is easy to convince oneself that oxidation alone does not cure any psoriasis. Take only the leuco product of the methylene blue, the methylene white, and let it be oxidized on the psoriatic skin: it will turn blue but the psoriasis does not change.

There remains the third possibility—namely, that not the original substance and not the process of oxidation, but the *final product of the latter* forms the principle of the therapeutic effect. Thus I have shown that one product of oxidation of pyrogallic acid, the "pyraloxin," still possesses some definite effects (in callous eczemas, lupus

erythematosus, leprosy, and so on). But the chrysophanic acid, which till now has been considered to be the final product of the oxidation of chrysarobin on the skin, does not possess the desired effect of curing psoriasis.

From these considerations we are compelled to acknowledge that, in spite of the valuable work of Liebermann, we do not know the true nature of the chrysarobin effect; we know only that it must consist in a change of chrysarobin yet unknown.

In the next twenty-two years after Liebermann's work there appeared numerous articles on its effect on skin diseases. The once dreaded remedy entered all the pharmacopoeias of the world. But the explanation of its effect, so much surpassing all other reducing remedies, made no progress.

Whenever such a standstill occurs in any scientific question, something has always proved wrong in the suppositions. We are able to-day to see where these faults lay. There are principally two.

The first consisted in the groundless supposition that the changes of chrysarobin on the skin could only be the oxidation to chrysophanic acid, because Attfield and Liebermann found this substance in their experiments.

The second error was the hypothesis generally made after Wurster's work in 1886, that in the oxidations occurring on the skin the influence of hydrogen peroxide only came in question. Wurster has the merit of having been the first to show us that in certain secretions, such as sweat and saliva, processes of oxidation occurred. He attributed these to the presence of hydrogen peroxide on the skin. Since then, so far as I can see, no other hypothesis explaining oxidation on the skin has been brought forward. If we exclude H_2O_2 we are helpless in explaining the oxidation on the skin, because of itself chrysarobin does not change; it is not "autoxidable."

Regarding the first hypothesis, I already in 1897 showed that the oxidation of chrysarobin to chrysophanic acid, which takes place so easily under co-operation with caustic alkalis, cannot occur in ordinary practice, because then the alkalis are usually wanting. On the other hand, I showed that the oxidation of chrysarobin upon the skin resembled more that occurring in the presence of *oleic acid* or *oleate of lead* (ointment of Hebra) in the ointment box.

Regarding the second point, I came to quite a similar conclusion, namely, I was able to show, together with Dr. Golodetz, with the help of a new test for free oxygen, which we called *Rongalitweiss*, that the oxidation on the skin was due to the presence of *oleic acid* on the skin surface, and that this substance originates from the sweat glands on the palmar and plantar surfaces, on all other regions from the sweat and sebum glands.

After discovering this new source of free oxygen on the skin surface, I had to prove that oleic acid was sufficient to oxidize chrysarobin. This investigation was much facilitated by the discovery that chrysarobin dissolved in benzol has a characteristic spectrum, which during oxidation also changes. It is characterized by two bands in the green lying closely together (535 and 510). If, however, the chrysarobin is oxidized in absence of alkalis, the spectrum shows only a broad indistinct band in the green, and an obscuration in the yellow. I propose to call this new body *oxychrysarobin* at present until its exact constitution is known. If we oxidize chrysarobin by means of oleic acid which has been in contact with air for some time, or by heated linseed oil (siccatif), by peroxide of benzoyl, by oleate of lead, or by persulphate of ammonia, in increasing degree oxychrysarobin results.

A totally different product is gained by the oxidation of chrysarobin in the presence of alkalis. If we, after Liebermann, conduct a stream of air through an alkaline solution of chrysarobin, we get chrysophanates; but if we continue this process for a very long time the change goes further, and finally, after adding acids, we get another product, easily soluble in benzol, which has also a characteristic spectrum—namely, an indistinct band in the green and chiefly a dark, sharply defined band in the red (625). I propose to call this product "chrysaloxin."

On the other hand, chrysophanic acid dissolved in benzol gives no spectrum; but, as Liebermann and Kostaniecki have shown, if dissolved in concentrated sulphuric acid, chrysophanic acid has a definite spectrum. In contrast to this, chrysarobin as well as oxychrysarobin and chrysaloxin have no spectrum at all if dissolved in concentrated sulphuric acid.

Making use of these spectra, there is no difficulty in defining the way which the oxidation of a given chrysarobin ointment takes on the skin. After the ointments have rested three to five days on the skin of a patient, the residue is washed off by means of pads of cotton-wool soaked in benzol. The concentrated benzol extract of these pads is then analysed by the spectroscope. Twelve patients suffering from psoriasis and treated in this manner gave always the same result—that simple chrysarobin-vaseline or chrysarobin in siccatif, changed into oxychrysarobin. In contrast to this, the ointment from one patient who, besides chrysarobin, used soft alkaline soap, and that from another, who used Drew's ointment, containing chrysarobin and soft soap, showed a distinct chrysaloxin spectrum.

If this new theory based upon oleic acid is right, we must in future conduct our treatment thus, that the change of chrysarobin into oxychrysarobin is hastened, facilitated, and increased. I therefore propose a generous use of chrysarobin siccatifs and of ointments containing, besides chrysarobin, oleates of lead. After a year's experience, I am able to recommend this form of treatment of psoriasis as an especially quick and thorough one.

REFERENCE.

[1] Unna, Uberhäutung und Uberhornung (Dermatoplasie und Keratoplasie), *Berl. klin. Woch.*, No. 35, 1883.

THE ACTION OF LIME SALTS.

By Professor HANS MEYER,

Vienna.

I SHOULD like to report some observations on the action of calcium which have recently been made in my laboratory. The physiological significance of any normal protoplasmic constituent can, in part at least, be judged from the effect of its absence, if by any means it can be rendered inactive.

Poisoning with oxalic acid seems a suitable method of thus getting rid of calcium. Various investigators (Zöw, Friedenthal) have already suggested that the action of oxalic acid is due to its withdrawing or combining with calcium, but have failed to produce the proof that this was the case; for, quite apart from its combining with calcium, oxalic acid might have some specific action upon the protoplasm.

The necessary proof has, however, been recently adduced by Dr. Januschke, who has shown that not only the cardiac depression, but the general toxic symptoms of oxalate poisoning can be relieved by the administration of calcium or of its physiological equivalent, strontium; while such other substances, as barium, which combine with oxalic acid, are not effective. The essential element in relieving the poisoning consists, therefore, in the replacing of the calcium withdrawn by the oxalic acid from the protoplasm, and not in combining with and rendering inactive the acid itself.

Some of the symptoms of oxalate poisoning are of particular interest—namely, the marked flow of saliva, the alternate maximal contraction and dilatation of the pupil, and the alternate rise and fall of blood pressure. The fall in pressure is accompanied by a slowing of the heart-beat, and the enormous sudden rise by an increase in rate. These symptoms seem to point to an increased irritability of the autonomous and sympathetic nervous systems due to the withdrawal of calcium; and Chiari and Fröhlich have been able to show that moderate (not lethal) poisoning with oxalic acid leads to such an enormous increase in the irritability of organs having a sympathetic innervation—for example, dilator pupillae, submaxillary gland, arteries, the inhibitory mechanism of the bladder—that they respond to small fractions of the usual effective dose of adrenalin. The autonomous system is similarly affected, and the cardiac vagus, the chorda tympani, the motoric innervation of the bladder, respond to small fractions of the usual dose of pilocarpine. The administration of calcium does away with this hyperirritability.

In poisoning with acids (hydrochloric acid) a part of the general picture is formed by the symptoms due to the withdrawal of calcium; this may be concluded from the findings of Allers and Bondi, who found that in every acid

intoxication the calcium content of the blood increases considerably, apparently at the cost of the tissues, which become relatively calcium poor. In how far this takes place also in other protoplasmic poisonings—for example, by mercury, phosphorus, and arsenic—is now under investigation. Drs. Fröhlich and Chiari have already stated in these poisonings an exaggeration of the adrenalin sensibility.

Another aspect of the action of calcium which has been studied by Chiari and Januschke seems not less interesting. Animals to whom calcium has been administered do not give inflammatory exudates as normal animals do. If one applies oil of mustard to the eye of a normal narcotized rabbit within twenty minutes a marked oedematous swelling of the conjunctiva takes place, so that the eye can scarcely be opened. If one poisons a guinea-pig with diphtheria toxin, or a dog with iodine or with thiosinamin, one finds very marked pleural and pericardial exudates *post mortem*.

If, however, the same experiments are carried out on animals to whom calcium has previously been administered the oedematous exudates and transudates are not formed. It seems as if the vessel walls, owing to the increase in their calcium content, had become less permeable. Experiments carried out by Dr. Luithlen show that the same is true of the skin. Exudative exanthemata can easily be produced in calcium-poor animals, but with difficulty or not at all in calcium-rich ones. Wright had already noted that serum exanthemata can be prevented or weakened by the administration of calcium. He attributed its efficacy to a greater coagulability of the blood; it appears, however, to be more a case of a change in the vessel walls.

Probably the decrease in the secretion of the glands of the intestine, which we recognize as a consequence of the drinking of calcium-rich waters, is to be similarly explained. Salts whose anions form with calcium insoluble compounds, and therefore deprive the tissue cells of calcium, all act as purgatives. To this fact Cushny and Wallace have already drawn attention. And here also, in part at least, the increased permeability of vessels and consequent more ready glandular secretion plays a part in their purgative action. That these salts, and also those of mercury, do withdraw considerable quantities of calcium from the intestinal wall has been demonstrated quantitatively by Dr. Chiari.

We believe that we have hereby demonstrated, first, that calcium has a sedative effect on the vegetative nervous system, and, secondly, that it diminishes the permeability of the walls of the blood vessels.

THE TREATMENT OF MORPHINOMANIA BY THE "COMBINED" METHOD.

By H. Crichton Miller, M.A., M.D Edin. and Pavia,
San Remo.

The method of treating morphinomania to which I desire to draw your attention to-day is one which combines both medicinal and moral treatment, and is directed both to the physical and psychical sides of the disease. At the outset let me make one or two prefatory remarks. First, I wish it to be understood that this paper is of the nature of a preliminary paper. In a disease like morphinomania no results are worth tabulating that have not stood the test of at least three years, and of such I have none to record. Secondly, let me point out that, though I shall speak only of morphinomania, the method, with necessary adaptations, is applicable also to any drug mania, including dipsomania, to alcoholism, to severe obsessions, and also to self-abuse. Finally, I would have you bear in mind that when I refer to the morphinomaniac I mean *the average morphinomaniac*, being well aware that where a disease may exist in any degree of severity or mildness it is impossible to generalize except for the average case.

There are three primary requisites in any system of cure for morphinomania. First, it must be painless, or as nearly so as possible. Secondly, it must be calculated to obliterate the craving completely and absolutely for a time, however brief. Thirdly, it must be specially designed to re-educate the will. Besides these three cardinal requisites I would add two further points—namely, that the treatment should be carried out in a nursing home or similar institution, for reasons too obvious to dwell on, and that the withdrawal of morphine should not be immediate.

Let us now pass on to an analysis—necessarily superficial—of the disease. A morphinomaniac is an individual whose mind is dominated or obsessed by the desire to take morphine, either to satisfy a present organismal craving or to reproduce a pleasing subjective condition, which he has previously attained by the use of the drug. Under the first heading comes the neutralizing of sensory hyperaesthesia, of excessive medullary stimulation, and of gastric hyperacidity. Under the second heading come the fascinating exhilaration and the intensification of imagination, and so on.

To state the case in other words, the morphinomaniac indulges either because of an organismal habit or through psychical association, or both. To put it more briefly still, there is the physical temptation, the psychical temptation, or the union of the two. In mild cases it is chiefly the psychical factor that is at work; in bad cases it is both, and in the worst cases the psychical factor is so paramount that we are apt to forget the other. Our object must therefore be to break the habit of the organism—that is, to remove the actual physical craving, and *during that time* (please note these words) to render the mind proof against the dominance of the craving in the future. Looked at from this point of view, it is manifest that both physical and psychical treatment are essential. Without drug treatment—and that on heroic lines—it is impossible to allay the craving of the organism for sedatives, for peace, for sleep (I would again remind you that I speak of the average case). As evidence of this, let me quote the words of Dr. Milne Bramwell, in reference to the treatment of alcoholism by hypnotic suggestion: "In the majority of the cases that failed it was impossible to get the patients to cease drinking during treatment." In other words, psychical treatment was rendered vain by the persistence of the organismal craving.

But there is another score on which drug treatment is most desirable—to wit, the fulfilment of my first requisite, painlessness. Most morphinomaniacs want to be well; few of them want to be cured. They are too much afraid of the weeks and months of suffering entailed in the process of cure; they know too well the agony they endured at each fruitless effort to abstain. Therefore, to get them to submit to treatment we must make it as nearly as we can painless. Douglas says: "I am convinced that morphine can never be eliminated from an addict without suffering. . . . I therefore lay down the general principle that sleep solves the problem of painless surgery." Any form of treatment that is purely moral or psychical, and free from drugs, must, in the nature of things, make a great demand on the patient to renounce the drug while the craving is actively and physically present. I submit, then, that complete and immediate obliteration of the organic craving is essential, and can only be produced by drugs.

On the other hand, I maintain that hypnotic suggestion is no less essential a part of the cure. When the physical craving has been provisionally eliminated, there remains a pure obsession—a concept that dominates the psychical activities. I think the profession has come to regard hypnotic suggestion as the most satisfactory—perhaps the only satisfactory—treatment for obsessions. I shall, therefore, make no further apology for recommending hypnotic suggestion, although I am perfectly aware of the scorn and scepticism with which this particular form of treatment is regarded by many physicians.

The details of the treatment which I recommend are as follows:

1. A course of nine weeks in a nursing home or similar institution. I consider this period as long as desirable, and yet short enough to bring the cure within the reach of most patients.

2. Examine the patient and make sure that there is nothing to contraindicate the treatment.

3. Explain to the patient very fully the nature of the cure. Let him see that you do not mean to treat him as a criminal, but that you want to help him. Explain that you will allow him practically as much morphine as he asks for during the first three days, and that by the end

Average Dosage for a Patient taking 0.30 Gram (gr. v) of Morphine per Diem.

Periods of 12 Hours.	No. of Doses.	Each Dose of		Total in 12 Hours.		Approximate Equivalents in Imperial Measure.			
						Each Dose.		Total in 12 Hours.	
		Bromide.	Morphine.	Bromide.	Morphine.	Bromide.	Morphine.	Bromide.	Morphine.
		Grams.	Milligrams.	Grams.	Milligrams.	Grains.			
First day	5	5.0	30	25	150	80	½ gr.	ʒvij	2½ gr.
First night	4	5.0	20	20	80	80	⅓ gr.	ʒv	1⅓ gr.
Second day	4	5.0	15	20	60	80	¼ gr.	ʒv	1 gr.
Second night	3	5.0	10	15	30	80	⅓ gr.	ʒiv	½ gr.
Third day	3*	5.0	7	15	21	80	⅓ gr.	ʒiv	⅓ gr.
Third night	1	5.0	5	5	5	80	1/12 gr.	ʒiss	1/12 gr.
Total in three days ...				100	346			ʒiijss	5¾ gr.

* Per rectum.

of that time he will be sound asleep, and free of the craving.

4. During the first three days of treatment, the patient should get a diminishing number of injections of diminishing strength (actual figures are given in the accompanying table), and on the third day the injections should be per rectum.

5. Before each injection he has to take a draught containing 5 grams of sodium bromide. The total for the three days should work out at about 100 grams. By the end of the third day both bromide and morphine are stopped, and the patient will be in a comatose or semicomatose condition which will last from three to six days more.

6. During all this time the patient is roused to take milk at regular intervals, and to be placed on the commode to empty bowel and bladder.

7. When the effects of the bromide begin to pass off there will be in all probability a certain amount of mental confusion, including hallucinations, delusions of persecution and so on. These will pass off soon.

8. As soon as the patient appears to be sufficiently sensible, efforts should be made to hypnotize him, and the lethargic state he is in will materially assist. Suitable suggestions must be made without waste of time, lest the craving should reassert itself before the mind is sufficiently influenced. This is the critical point of the whole cure.

9. As soon as possible the patients should be brought into one room and hypnotized collectively. This I consider of very great importance, as would any one who has seen the method practised abroad. All the most successful exponents of treatment by suggestion on the Continent lay great stress on the value of this method—Bertillon, Van Renterghem, the late Dr. Wetterstrand, and many others. It serves two purposes: (*a*) to facilitate the hypnotization of obstinate cases; (*b*) to enhance the effect on all that respond.

10. During this period—that is from the second to the end of the seventh week—the patients should be strictly supervised, and no access to drugs allowed. Everything is done to make life interesting, and to promote the general health of the patients.

11. During the eighth and ninth weeks the patients should be allowed to keep their morphine and syringes. The hypnotic sittings should be reduced in number, and should have special reference towards teaching the patient to put himself to sleep—that is, autohypnosis. I would lay great stress on this point. Autohypnosis is, I believe, a mental knack or trick that can be acquired through hypnotic suggestion by all but a certain percentage of mental invertebrates. Once acquired, this power will serve to give the patient in the future a ready refuge from worry or pain, or anything else that might otherwise lead to thoughts of morphine.

I have tried to sketch out the plan of treatment I recommend, but within the limits of a paper such as this it is quite impossible to enter into minutiae. I can only mention a few points. During the period of drug treatment other drugs will of course be necessary, such as sparteine, which, with Jennings, I believe to be the most suitable cardiac tonic; ichthyol, which I recommend instead of arsenic, as suggested by Macleod, to prevent symptoms of bromism; alkalis to mitigate the hyperchlorhydria that is usually present, and possibly a stimulant expectorant to minimize the risk of pulmonary oedema.

Nor have I time to refer to the complex causes so frequently met with, such as alcoholism and morphinomania (in which the former should be treated first); morphinomania and cocaine habit (perhaps the most obstinate of all the cases), or alcoholism and masturbation, which form another very bad pair.

I pass now to a brief survey of some of the modern methods of treating drug habits, with a few observations.

1. Oscar Jennings has described very fully his method, which is briefly this: (*a*) A gradual reduction of the morphine; (*b*) administration of the morphine per rectum; (*c*) sparteine and other heart tonics; (*d*) Vichy water for hyperacidity; (*e*) Turkish baths.

I think Jennings is correct with regard to the rectal administration when the morphine has been reduced to a certain point. I also agree with him in recommending sparteine, but, in my opinion, his method leaves far too much to the patient's unaided will power. It may succeed in some cases, but I submit that it is not likely to prove successful with a morphinomaniac of any degree of severity. Furthermore, I am convinced that it is morally too painful to be attractive. The patient, before consenting to treatment, will see before him the prospect of a long and hideous struggle, during which his craving may be mitigated but will not be entirely removed.

2. Neil Macleod of Shanghai was the first to describe the prolonged bromide sleep and to point out its value and its safety. For the first part of the treatment I consider his method the best, but I differ from him absolutely in considering such treatment complete unless it is followed by definite and vigorous psychical treatment. I also agree with Macleod's three days for the reduction of the morphine.

3. Douglas recommends apomorphine in doses of $\frac{1}{30}$ grain as a hypnotic. I cannot bring myself to believe that this drug is as safe or as satisfactory as sodium bromide, but I very heartily agree with his general dictum already quoted. Any cure that is devised without regard to this dictum can never, in my opinion, be of general or successful application.

4. Crothers has compared very carefully the results of different methods of withdrawal, and has shown that even immediate withdrawal is hardly ever fatal. He approves of sodium bromide as a substitute, but his doses are much smaller than Macleod's, and on that account I do not think his results can be as satisfactory, while I do not believe his method is a whit safer. Crothers prefers gradual reduction by concealed methods, waking suggestion, and a cure period of six to ten months. Of course, this is too long for practical purposes. For one morphinomaniac who will submit to a nine months' cure, at least ten will submit to a nine weeks' cure.

5. For a thoroughly scientific analysis of morphinomania no better account could be wished for than that given by Professor Dixon in the *Practitioner* three years ago. I have no time to refer to it in detail, but a perusal

of it will, I think, convince any one that the lines of treatment I have recommended are, as far as drugs are concerned, rational and indicated. Professor Dixon also recommends the plan used by Jennings, which I have adopted, of administering the morphine per rectum.

I trust that what I have said will lead others to try this plan of treatment, and that they will be able to modify and improve it with experience, and in any case I hope that I may have persuaded some of you that there is a place in our scheme of therapeutics even for hypnotic suggestion, and others of you that even the pharmacopoeia can sometimes afford help to psychic treatment.

COMPARATIVE THERAPEUTIC VALUE OF THE ORGANIC AND INORGANIC COMPOUNDS OF CERTAIN ELEMENTARY BODIES.

By J. M. Fortescue-Brickdale, M.A., M.D.Oxon.,
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During recent years manufacturers have placed on the market a vast number of synthetic compounds intended to replace the simpler inorganic salts which have hitherto been so largely used in medical practice. Speaking generally, the aim of the manufacturer has been (1) to provide the physician with a means of giving certain elementary substances without producing harmful symptoms or unpleasant after-effects; and (2) to ensure more complete assimilation from the alimentary tract than is stated to occur with older preparations. These aims are not usually coincident, and, indeed, it is only under special and somewhat exceptional circumstances that diminished toxicity can be secured, together with increased absorbability. In considering each group of organic bodies we shall therefore have to distinguish clearly between these two objects, and within the limits of this paper it will only be possible to deal with the following important groups of drugs: (1) The halogen elements, iodine and bromine; (2) arsenic; (3) phosphorus; (4) iron.

1. *The Halogens.*

The avowed objects of the introducers of the organic halogen compounds have been to avoid, first, the gastric disturbances resulting from the administration of bromides and iodides; and, secondly, the toxic symptoms, such as the exanthemata which occasionally occur during their use. To deal with these separately, it should be noted that in the first place gastric disturbances after ordinary doses of bromides and iodides are not very common. At any rate, they do not constitute that formidable objection to their employment which certain manufacturers suggest. Such disturbances are due to vigorous osmotic action set up by the contact of hypertonic solutions with the cells of the gastric mucosa, and can be actually avoided in almost all cases by adequate dilution. This is a far simpler method of overcoming the difficulty than that of using a synthetic compound containing the halogen in a complex and stable molecule which may not be decomposed till it reaches the intestine.

A far more real difficulty is the possibility of secondary toxic effects, and before this can be discussed we must consider the mode of action of halogen compounds, and remember that their therapeutic activity is due to their electrolytic dissociation, whereby iodine and bromine ions* are set free to act on the cells—for example, $KI \rightleftarrows \overset{+}{K} + \overset{-}{I}$. These ions, especially the iodidions, are active protoplasmic poisons, having certain selective affinities, and it is most probable that the toxic effects are also due to them, although some ingenious theorists attribute toxicity to free bromine and iodine. Generally speaking, the probability of toxic effects increases with the dosage, although in certain cases unpleasant symptoms appear even after very small amounts have been taken.

In the following tables the amount of the halogen element given in the daily dose of the more important new organic compounds is calculated and compared with that of the potassium salts:

Iodine Compounds.

Compound.	Percentage I.	Daily Dose.	Amount of I in Daily Dose.
			Grains.
1. *Iodalbin*—stable protein compound insoluble in water	21·5	30 grains	6·45
2. *Iodoglidine*—stable vegetable protein compound insoluble in water	10	3 tablets	2·25
3. *Sajodin*—a calcium iodine soap insoluble in water	26	75 grains	14·5
4. *Iodipin*—addition product derived from iodine and sesame oil	10	3 drachms	18
5. *Olivenol iodate*—a similar product from olive oil	7·6	10 c.cm.	11·4
6. *Tiodine*—thiosinamine ethyl iodide $CS\langle^{NH\,C_3H_5}_{NH_2}$ C_2H_5I —a soluble body yielding iodine on oxidation	50	4·5 grains	2·25
7. *Iodival*—iodine isovalerylurea $CO\langle^{NH\,CO\,CHI\,CH\,(CH_3)_2}_{NH_2}$	47	15 grains	7·05
8. *Potassium iodide*	76·5	30 grains	22·9

Bromine Compounds.

Compound.	Percentage Br.	Daily Dose.	Amount of Br in Daily Dose.
			Grains.
1. *Bromalbacid*—a protein compound soluble in water	6	30 grains	1·8
2. *Bromocoll*—a gelatine tannate compound insoluble in water	20	70 grains	15
3. *Bromipin*—similar to iodipin ...	10	3 drachms	18
4. *Bromolein*—a compound with oil of almonds	20	(?)	(?)
5. *Bromural*—similar to iodival ...	41·3	15 grains	6·2
6. *Bromalin*—brom-ethyl-formin—$(CH_2{:}CN_4C_2H_5Br$ —clinically has toxic side-effects	30·9	135 grains	54
7. *Bromamide*—hydrobromide of tribrom-aniline—$C_6H_2Br_3NH_2HBr$*	(77·8) = 19·4	45 grains	7·38
8. *Brometone*—tribrom-butyl-alcohol—$CBr_3\,C\langle^{CH_3}_{CH_3}\rangle OH$	77·1	15 grains	11·6
9. *Potassium bromide*	67·3	90 grains	60

* Chemically stable. The Br is not split off the benzene ring in the animal body, so that only one-fourth the Br is available.

Note.—Neuronal (diethyl-brom-acetamide) has not been included, as it is a somewhat powerful hypnotic, and was not introduced as a substitute for the alkaline bromides.

It is at once evident that the amount of halogen given in almost all cases is very far short of that prescribed in the ordinary dose of an alkaline iodide or bromide. The exceptions are bromalin, which itself gives rise to toxic effects, and the two sesame oil preparations, which are generally considered clinically to be the most efficacious of these bodies. The manufacturers state that the small amounts of the organically combined halogens are more effective owing to their slower excretion. But it is quite clear that it is not until the halogen is split off and ionized that its therapeutic activity and also its liability to rapid elimination begins. Moreover, although 65 to 80 per cent. of iodine may reappear in the urine in twenty-four hours, when KI is given by the mouth, this leaves a considerable residue—say 7 grains, with a daily dosage of 30 grains—or more than the total contained in most of the organic compounds. It must be remembered, too, that bromine is less rapidly excreted than iodine.

We are, then, forced to the conclusion that the organic halogen compounds are only non-toxic owing to the small amount of the element which they contain or yield to the

* Or, as some chemists term them, iodidions and bromidions, etc.

organism, and that their therapeutic value is limited to those cases in which such very small amounts can be shown to be efficacious.

As has been noted, the sesame oil compounds contain a comparatively large amount of the halogen, but it seems doubtful whether the hypodermic introduction of these bodies is really a scientific proceeding, involving as it does a complete loss of control over the dosage, when once the injection has been given. The fact that the bromine compounds generally have not obtained any wide application in cases of epilepsy where the results can easily be gauged, suggests that the iodine analogues are equally inactive, but that the cases in which they are employed do not give such definite indications of the efficacy (or otherwise) of the therapeutic agent adopted.

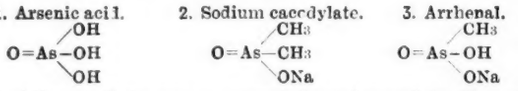
2. *Arsenic.*

In Dr. W. Harrison Martindale's communication to the International Congress of Applied Chemistry last year there are notes on no less than thirty-nine organic compounds containing arsenic. It is therefore obvious that in the time at my disposal I can only deal in very general terms with this large series of bodies. We may consider the arsenic-containing drugs in three groups, one inorganic, and two organic, namely, those belonging to the aliphatic series and aromatic respectively.

1. The inorganic arsenic compounds, arsenic acid, and arsenious acid owe their pharmacological value and produce their toxic effects by means of dissociated arsenate and arsenious ions. Although there is usually no very marked difference in the action of these two when given internally, Leduc states that when introduced by cataphoresis the arsenate ion is much less caustic than the other. The excretion is mainly by the urine and is slow.

2. The aliphatic arsenic compounds which have been introduced as being equally efficacious and much less toxic than the older drugs are known as sodium cacodylate and arrhenal. They are obtained by the substitution of methyl groups for one and two of the hydroxyls respectively, and the conversion of the resulting acid into a sodium salt.

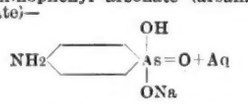
1. Arsenic acid. 2. Sodium cacodylate. 3. Arrhenal.



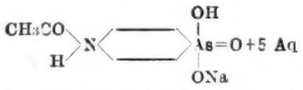
Both of these substances are excreted unchanged in the urine and although they are probably broken down in the body, giving rise to ordinary arsenic ions, this takes place to so minute an extent that large doses may be given without producing any therapeutic, much less toxic, effect. These aliphatic compounds are, therefore, of no practical use, and others which have been prepared have not been tested pharmacologically.

3. With regard to the aromatic compounds of arsenic, however, a different conclusion must be drawn. The more important of these bodies are shown in the following table:

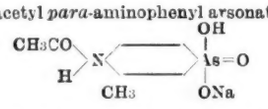
1. Sodium *para*-aminophenyl arsonate (arsamin, atoxyl, soamin sodium arsanilate)—



2. Sodium acetyl *para* aminophenyl arsonate (arsacetin, acetyl-atoxyl)—



3. Sodium methyl acetyl *para*-aminophenyl arsonate (orsudan)—



With regard to atoxyl, which is the best known of these three bodies, its therapeutic effects are not simply those of an arsenic anhydride ion. The fate of atoxyl in the body has been variously described, but it is quite clear that its characteristic action (that on trypanosomes) is due to the action of a complex organic ion. In man, the excretion of atoxyl usually amounts to 50 to 90 per cent within nine hours, partly as atoxyl and partly in another form, the latter being found in the urine for several days (Ingersheimer and Röthmann). The atoxyl retained in the body is to some extent decomposed, so that after a sufficiently long time enough inorganic arsenic is formed to produce the ordinary toxic symptoms.

Two main theories exist as to the nature of the changes which take place in the retained organic arsenic compound. Ehrlich thinks that a reduction product (such as *p* amidophenol arsenic oxide, $NH_2.C_6H_4\,As=O$), in which As is trivalent, is the trypanocidal agent; Levaditi, that the reduction product can only act on the trypanosomes by the intervention of the products of cellular activity as amboceptors. On the other hand, Breinl and Nierenstein can find no evidence in support of the view that a reduction product is actually formed (except in the intestinal canal), and believe rather that an oxidation process is the most important factor in the production of a trypanocidal body, by which means atoxyl can be eliminated combined with glycuronic or sulphuric acids (*Entgiftung*). They believe further that a small amount combines, through the amido group, with the proteins of the blood plasma, from which the arsenic is set free by an oxidation process, and thus in a nascent condition kills the trypanosomes.

It will be seen that in the action of atoxyl and some of its allies on trypanosomes a new pharmacodynamic process is involved. Thus, in this case the organically combined element has a value which differs materially from that of the simple inorganic anhydride. When, however, atoxyl is applied to the treatment of syphilis, chorea, or any of the grave forms of anaemia, there is no evidence that any further action takes place than can be ascribed to the gradual splitting off of inorganic arsenic, and thus no advantage is gained in giving a rapidly eliminated form in large doses, rather than one which, being slowly excreted, can be given in small ones.

3. *Phosphorus.*

The inorganic forms of phosphorus are the salts of the alkalis and alkaline earths; the organic forms are the glycerophosphates, the nucleins and phosphoproteides (paranucleins), and some vegetable phosphorus-containing proteins (for example, phytin). Phosphorus having been largely given as a "brain food" and "nerve tonic," it may be well to point out that there is at present no evidence that the central nervous system is ever in a condition of phosphorus starvation W. Koch found that, as compared with normal brains, there was no diminution in the lecithin content of brains of persons suffering from dementia praecox, and hardly any in those of general paralytics; and that, even if there was considerable phosphorus loss, it could be made good from stores in other parts of the body, were any regenerative power present in the central nervous system of such patients.

The actual amount of phosphorus necessary per diem has been estimated by Ehrström at 0.06 gram per kilogram body weight. This appears to be an outside figure. It is quite covered by the amount contained in an ordinary mixed diet. The questions remain whether the addition of further phosphorus compounds has any physiological effect, and whether, if so, any difference can be observed between the organically combined phosphorus and the ordinary inorganic salts.

It has been thought that increased nitrogen as well as increased phosphorus retention followed the administration of extra quantities of phosphorus by the mouth. The experimental evidence on this and other points connected with the rôle of phosphorus in the body is not altogether harmonious, but the following results are worth consideration: Many observers have shown that during periods of active growth the phosphorus and nitrogen balances rise together, but under other circumstances this is not always the case.

Clerc and Cook showed that though, when animals were given food rich in phosphorus, the addition of inorganic and organic phosphorus did not cause any retention of the element, yet when the food was poor in phosphorus organic but not inorganic phosphorus caused an increased retention of both nitrogen and phosphorus.

As regards the absorption of phosphorus from the intestine, much depends on the character of the diet as a whole. Milk fats, for example, by combining with the calcium in the intestine to form insoluble soaps, set free P_2O_5, which can combine with alkaline bases to form soluble and absorbable phosphates. Free fatty acids may cause a breaking down of lecithins, to form neutral fats with the liberation of P_2O_5 (Ferrata and Moruzzi). The presence of calcium hinders phosphorus absorption, owing to the insolubility of calcium phosphate, and the presence of potassium as compared with sodium bases in the diet causes a considerable rise in phosphorus excretion, owing to the fact that calcium phosphate is insoluble in

organic solutions containing potassium carbonate, but soluble in those containing the corresponding sodium salt. Hence, under the latter circumstances, phosphate does not appear in the faeces.

Keller, by using sodium phosphate, was able to demonstrate phosphorus retention in an infant, whereas Tunnicliffe, using calcium phosphate, showed that no increase but rather a slight fall in phosphorus retention occurred in a healthy child. At the same time he showed that the glycerophosphates caused an increased nitrogen and phosphorus retention, whereas Marfori found that glycerophosphate of soda injected hypodermically caused increased phosphorus and nitrogen excretion (that is, stimulated katabolism) though the phosphorus content of the faeces was not increased. He found similar effects produced by lecithin when given by the mouth.

4. *Iron.*

The terms "organic" and "inorganic," as applied to preparations of iron are not used in the usual chemical sense. The inorganic are those from which metallic ions are readily split off when in solution, and which consequently give certain chemical reactions, the most delicate of which is Macallum's test (0.5 per cent. watery solution of haematoxylin). Between these two comes a third or intermediate class, in which the chemical tests are given imperfectly and slowly. Examples of organic iron are haemoglobin and preparations from fresh or dried blood (haemol, haemogallol); intermediate substances are represented by Schmiedeberg's ferratin and carniferrin; inorganic compounds not only by the ordinary ferrous and ferric salts, including the tartrate, acetate, and other compounds with organic acids, but also the so-called albuminate and peptonate.

For our present purpose we need only consider these three groups from the standpoint of their absorbability, retention in the body, and local action on the gastro-intestinal tract.

1. The absorption of iron probably always takes place in an ionized or partially ionized condition. Schirokauer, who made observations on dogs with gastric fistulae, and also on the human subject, was able to show that all iron compounds in the stomach were converted into loosely combined albuminous compounds, the protein portion of which became a diffusible peptone which was directly absorbed (in the duodenum) with the iron as an alkaline peptonate.

Abderhalden has shown that organic iron compounds are broken down and absorbed in the ionized state in which they stain with ammonium sulphide. Thus, as far as absorption is concerned, there is very little to choose between the organic and inorganic preparations.

2. As regards retention in the body, experiments by Cloëtta show that ferratin was stored in the liver to a greater extent than iron tartrate, though the blood in both cases yielded the same amount. There may, then, be some advantage to the organism in obtaining iron in an organic form.

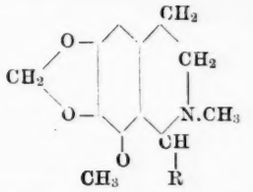
3. It is really, however, only in the matter of their irritant action on the gastro-intestinal mucosa that the inorganic salts of iron present any real disadvantage as compared with organic combinations; and even here the astringency varies among the different salts so that it is usually possible to select one which is easily tolerated by the patient. The action on the teeth may to a certain extent be taken as an index, and Morgenstern, who has investigated this point, finds that the albuminate, the saccharated solution of the manganate and reduced iron have no more injurious effect than ferratin, while the citrate has hardly any action. It may, then, be concluded that though the astringent action is a disadvantage, this may be avoided by selecting a preparation either from the organic or inorganic groups.

THE ACTION OF HYDRASTININE AND COTARNINE.

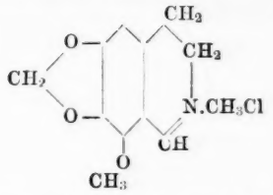
By P. P. LAIDLAW, B.C.,
London.

A NUMBER of closely related isoquinoline alkaloids are known which produce convulsant effects on animals. This convulsant action appears to bear quite definite relationship to chemical constitution. These alkaloids fall into three groups: (1) Narcotine series; (2) hydrastine series; (3) laudanosine series.

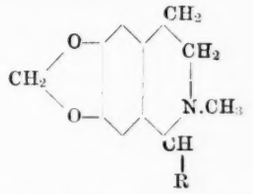
1. In the narcotine series the general formula—



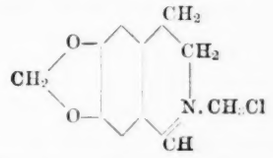
represents a number of convulsant poisons. R may be an opianyl, benzyl, phenyl, propyl ethyl group, or merely hydrogen. They are all tetrahydro *iso*quinoline derivatives. Substances which are not tetrahydro derivatives are devoid of convulsant action, for example, cotarnine:



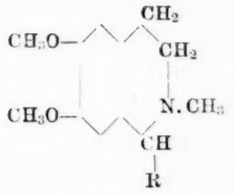
2. In the hydrastine series a similar relationship obtains:



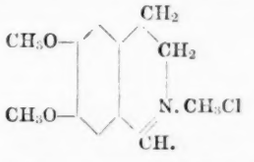
Substances of this type are again convulsant poisons, whereas hydrastinine (cf. cotarnine) is devoid of this effect:



3. In the laudanosine series similarly substances of the type



are convulsant poisons, while 6:7 dimethoxy 2 methyl 3:4 dihydro isoquinolinium chloride is not:



These facts may be summarized in a law: N-methyl isoquinoline derivatives substituted in the 6·7 8 positions with methoxy or methylene dioxy groups are or are not convulsant poisons according as they are tetrahydro isoquinoline derivatives or not.

Isoquinoline derivatives which have no methyl group in relation to the nitrogen react differently—for example, papaverine. The convulsant action of many of these alkaloids renders them of no value in therapeutics; cotarnine and hydrastinine, however, are devoid of this effect. In fact, they have a mild depressant action on the central nervous system, and cause death by depression of the respiratory centre.

When injected intravenously hydrastinine causes a rise of blood pressure which is partly due to increased cardiac output, and partly due to vaso-constriction.

The vaso-constriction is usually attributed to an effect on the vasomotor centre. This is not the case; a diminished outflow from the vein is observable in perfusion experiments when hydrastinine is administered. The rise of blood pressure is no greater in an anaesthetized animal than in a spinal one. After sufficient ergotoxine has been given to reverse the adrenine response, the rise of blood pressure is unimpaired. The vaso-constriction is slight, and cannot be considered to be sufficient to account for the haemostatic reputation of hydrastinine.

Cotarnine causes a fall of blood pressure, which is for the most part of cardiac origin. The calibre of the arterioles is, as a rule, unchanged; occasionally a slight dilatation is observed in perfusion experiments. Here, again, there is no action which could produce a haemostatic effect; neither of the two alkaloids has any effect on the coagulation time of blood.

Their rational application appears to be limited to cases of uterine haemorrhage, for they have a distinct although not very powerful effect in producing contraction of the uterus. This is the result of two factors: (1) A direct stimulating effect on the plain muscle; and (2) a stimulating effect on the peripheral neurone supplying this muscle. In the virgin cat the net result of these two actions is inhibition. In the pregnant cat or in the rabbit the effect is a well-marked contraction. In the case of the isolated organ the effect is always motor.

DISCUSSION ON THE EFFECTS OF DIGITALIS ON THE HUMAN HEART.

I.—Dr. K. F. WENCKEBACH,

Professor of Medicine, University of Groningen.

[Before Dr. Wenckebach delivered his address, Professor CUSHNY (the President) said that the Section was about to discuss the action of one of the most reliable and important members of the *Pharmacopoeia*. It had been shown experimentally that digitalis had a double action—on the inhibitory cardiac function and on the heart muscle. The laboratory investigators now asked the clinicians whether these two factors were properly balanced in digitalis, or whether the therapeutic action would be improved by augmenting one or other factor. If the clinicians would answer this question the experimental investigator could go further, and would be prepared to supply the needs of the clinician. But the clinical opinion must be backed by actual measurements, which would be comparable to those obtained in the laboratory. He hoped that the discussion that morning would supply an answer to this question.]

Among drugs used for many years there is none perhaps more relied upon, more rightly trusted to, than digitalis. No practitioner ever failed to see its marvellous effects in appropriate cases. Moreover its pharmacology offers a number of most tempting problems. Thus the scientific mind as well as the whole profession, is equally attracted to the study of digitalis, anxious to get a complete insight into the mode of its action, and to see a parallelism established between experimental results and clinical observation. I understand that our President of to-day, who is himself a well-known authority on the experimental side of digitalis, wants me to try to make such a parallelism before you, and to see how far experimental data may be recognized in clinical symptoms, and what might be concluded from it.

What everybody knows about digitalis is, that in cases of heart failure with small and weak pulse, quick and irregular rhythm, with dilatation of its chambers, overfilling of the veins, dysuria and dropsy, it works wonderfully, slows and steadies the heart, raises blood pressure, aids diuresis, and drains the dropsical limbs. We know that in some cases, not well defined yet, it loses its beneficial effect, or even may do harm; that in large doses, or if given for too long a time it accumulates in the body and causes symptoms of poisoning. So we give it, as Withering did 125 years ago, until a desirable effect is reached, and certainly stop it as soon as any inconvenience of its use might appear.

Precise directions for prescription cannot yet be given. Every physician who has to treat a great number of heart patients is obliged to acquire a personal skill in administering this drug, and as a matter of fact every one has his own way. But this is far from what we all hope to attain. We want more and better and precise guides as to how and when to give it and where to avoid it, and we feel that our knowledge is still far from satisfactory.

We may proceed in two ways, first by careful experimental work as much comparable with clinical conditions as possible, secondly by deeper analysis of the heart action and the conditions of the circulation in disease, as well before as after giving digitalis. The first way is opened by such men as Traube, Böhm, Lauder Brunton, Schmiedeberg and his pupils, Cushny, Wybauw, Gottlieb and Magnus, and many others.

But we know how questionable it is to apply experimental results to clinical conditions and how the action of a drug on a normal heart may widely differ from its effect on a diseased heart.

The second way, if not discovered, has been at least widened and made accessible to the profession by modern methods of analysing the heart action and gauging the blood pressure in man, a field in which English physicians such as James Mackenzie, Schäfer, Oliver, and many others, have done work of everlasting value.

We will now see how far both ways may lead us, and, in very concise form, compare clinical and experimental results.

I.—*The Change in Rate of the Heart.*

In man there is not only the well known slowing of the heart after digitalis, but there is one effect more—*the rhythm becomes always irregular.* These facts are easily demonstrated.

I will show you diagrams of the effect of digitalis in different cases. These diagrams are so arranged that the distance between the pulse waves (pulse periods) has been put on ordinates giving one-thirtieth of seconds.

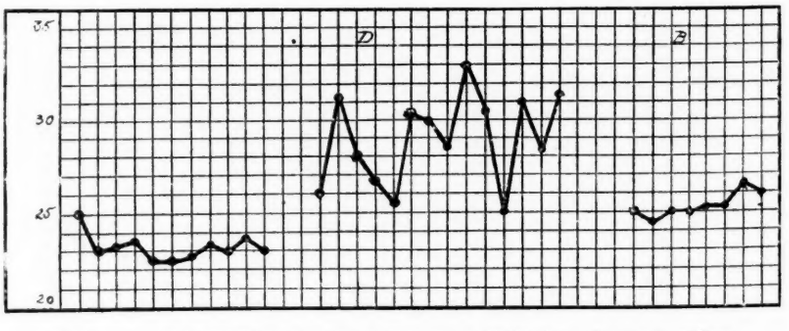


Fig. 1.—Very bad condition of valvular disease. D, Digitalis; B, bromo-camphor.

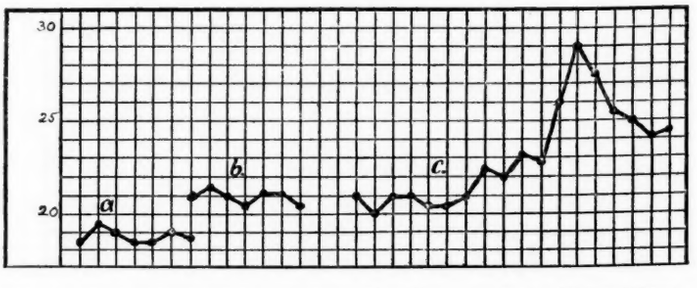


Fig. 2.—Aortic incompetence. *a*, First tracing taken; *b*, after resting five days; *c*, after digitalis, 1·50 grams powder in ten days.

(*a*) *Regular* rhythm before digitalis. (See Figs. 1 to 8.)

We see that a regular rhythm becomes slower after digitalis, *and invariably becomes irregular.*

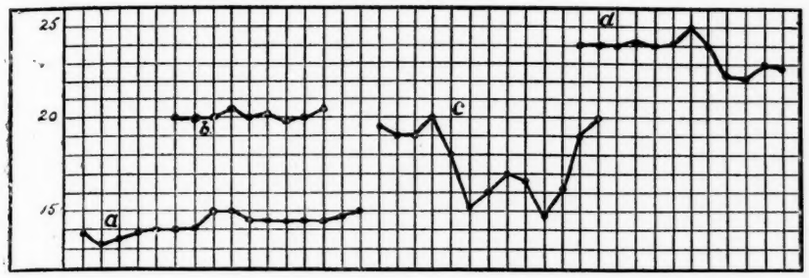


Fig. 3.—Angina pectoris: fatal case; small effect. *a*, After exercise (pulsus alternans) (see Fig. 19); *b*, after a rest; *c*, after 1.5 grams of digitalis; *d*, same tracing as *c*.

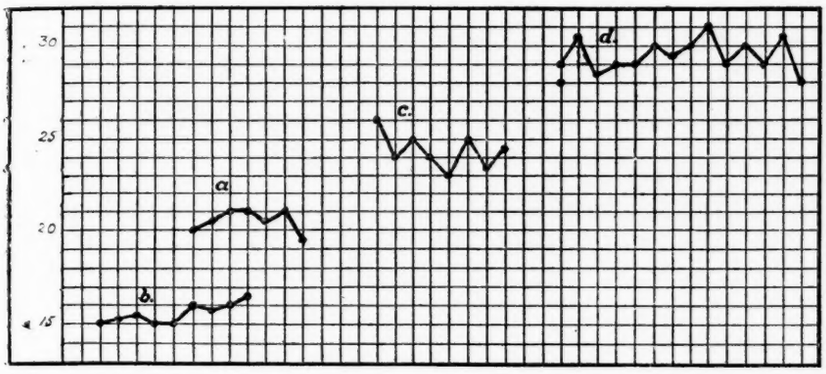


Fig. 4.—*a*, After resting; *b*, after dinner (extra-systoles) (see Fig. 22); *c*, *d*, after small doses. (3·5 grams powdered digitalis leaves in five weeks!)

(*b*) *True irregular rhythm* (of the whole heart). Here the existing irregularity is largely increased by digitalis; at the same time the rhythm is slowed considerably. (See Figs. 9 and 10.)

Another instance, from a case which has been published two years ago, shows that a periodical heart action undergoes the same changes, the pauses between the periods becoming so long that digitalis had to be stopped immediately. (*Archiv. f. Physiol.*, 1908, p. 53.)

I emphasize the fact that the irregularity in these cases was caused by an irregular rhythm of the whole heart, not by extra-systoles or other abnormal mechanisms.

(*c*) *Continuous Irregularity.*—In such cases of what Mackenzie called "nodal rhythm," and what we now know as to be probably cases of fibrillation of the auricles, digitalis has a strong effect, as shown by Mackenzie and others, in slowing the heart and increasing the long pause between the beats. The enormous effect on these hearts is clearly written in these diagrams. (See Figs. 11 to 14.)

Seeing this effect of digitalis, we ask ourselves: Is this slowing of the heart in man caused by vagus action of the drug or is it a change in heart muscle?

After Ackermann, Cushny showed that it is vagus inhibition, and that section of the vagi or atropine paralysing the vagus deprives digitalis of its slowing property. Gottlieb and Magnus afforded new proof by showing that in the excised mammalian heart all slowing fails to appear. Why should it be otherwise in man? We can afford, however, better proof than analogy alone. It is well known that the vagus nerve acts mainly on those parts of the heart where normally the contractions and the rhythm start—namely, at the veins and the right auricle. As soon as the functional connexion between auricles and ventricles is suspended by cutting the atrio-ventricular bundle the vagus acts on the auricles only, and loses its control over the ventricles, as Erlanger quite recently clearly demonstrated. Therefore we have in cases of heart-block a beautiful object for studying whether a given drug acts on the heart directly or by means of the vagus. Now I found in cases tested purposely on this matter that in heart-block digitalis slows the auricles only and does not affect the ventricles. For instance, in the case published by Van den Heuvel the period of the auricular beat is lengthened from 15–30 to 18–30 sec., the period of the ventricles remaining 43.5–30 to 44–30 sec. If the slowing effect of digitalis were due to muscular action the ventricular rate should have been altered as well as the auricular. Moreover, the form of the irregularity caused by digitalis at the same time as the slowing consists, as we have seen, in retardations of the pulse-rate, and for long has been known as the "vagus pulse." Now slowing and irregularity belong to the same influence, come from the same origin. We always see both of them; as soon as there is no slowing there is no irregularity. (See Fig. 15)

Another question is raised by these cases of fibrillation of the auricles. May the extreme slowing after digitalis here, too, be ascribed to vagus inhibition? The answer is affirmative. In experiments it has been shown that the vagus has not lost its power on such hearts, and I can prove the same thing in man. The next tracings are taken in such cases, and show the effect of simple pressure of the finger-tips on the right vagus nerve at the neck. (See Figs. 16 and 17.)

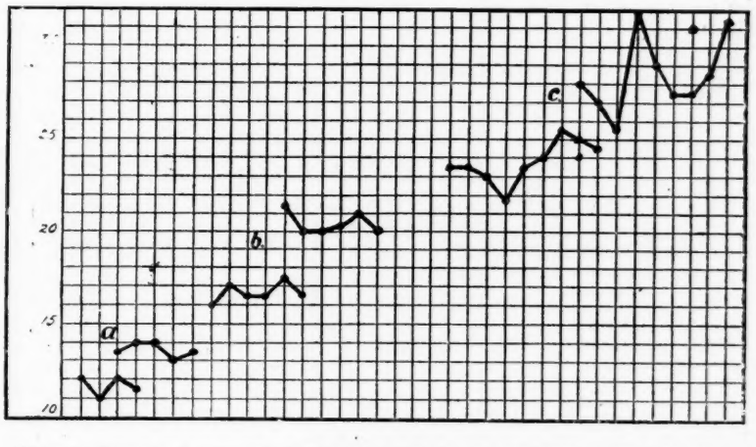


Fig. 5.—Nervous tachycardia (alternating pulse). (See Fig. 20) *a*, First tracings taken; *b*, later tracings; *c*, after digitalis, 0·25 gr infusion every day during ten days.

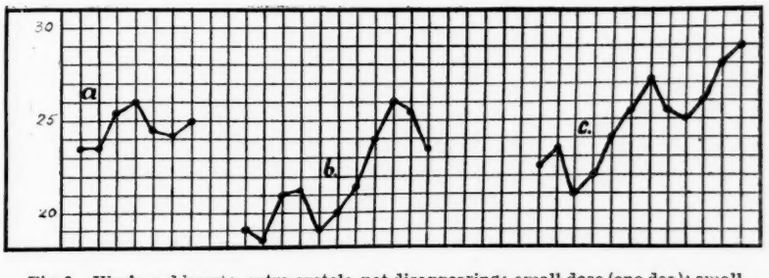


Fig. 6.—Weakened heart; extra-systole, not disappearing; small dose (one day); small effect. *a*, Absolute rest; *b*, after exercise; *c*, 0.120 digitalis.

A case, not proving anything but remarkable enough, is

the following, in which there was no valvular disease, but fibrillation only. (See Fig. 18.) Here digitalis had no effect

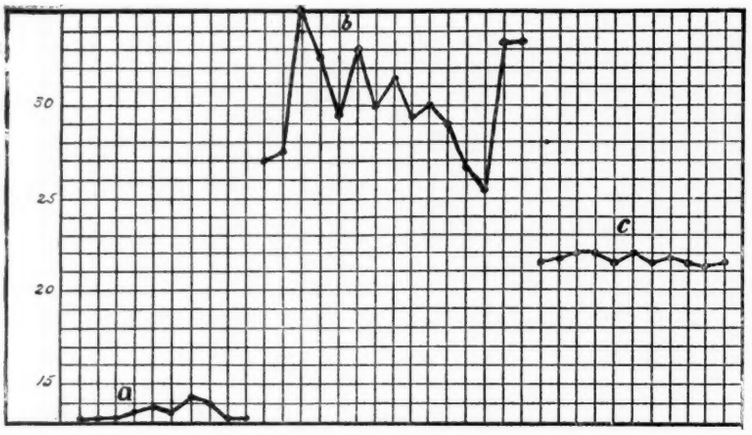


Fig. 7.—Tachycardia (not paroxysmal). *a*, First tracings taken; *b*, after 0.5 gram digitalis; *c*, a fortnight later.

whatever. The man died suddenly, and now looking up his tracings I find that vagus pressure also had had no effect whatever on his pulse-rate. As I said, the case alone does not prove anything, but offers quite a bundle of questions which time does not permit me to insist upon.

Conclusion.—In man digitalis, even in very small doses, slows the heart, makes a regular heart irregular, an irregular heart still more irregular, without disturbing its mechanism. This double effect is due to vagus-inhibition.

II.—*Strength, Contractility.*

The strength of the heart cannot be measured in man, but being the origin of the energy of circulation may be estimated from the conditions of circulation in any patient. Without neglecting the many factors, vascular and others, coming into play, we may safely conclude that digitalis in man as well as in experiment increases the strength of the heart, this property being the chief factor of its success in therapy.

Experimentally, Cushny, Gottlieb, and Magnus have proved that this strengthening of the heart beat is caused by digitalis acting on the heart muscle. So we may by analogy presume that in man the same effect is reached by the same way. Besides, we know that stimulation of the vagus rather diminishes the contractility (auricles, staircase phenomenon). So we seem to be safe in our conclusion.

There is, however, one question to be dealt with. Mackenzie argued as follows: Pulsus alternans is a sign of impaired contractility of the heart. Digitalis in many

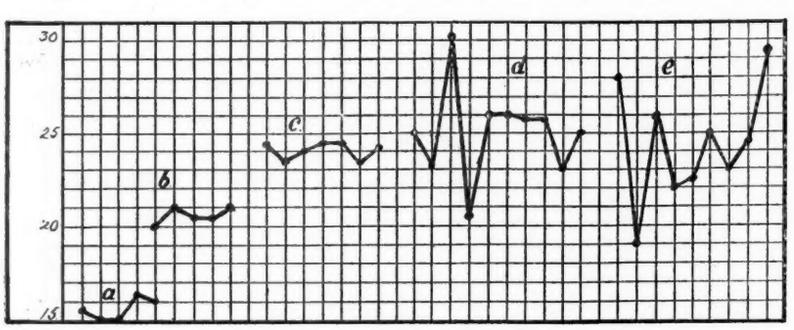


Fig. 8.—Morbus Addisoni. *a*, After slight exercise; *b*, sitting; *c*, lying; *d*, *e*, after 0.5 digitalis (powder) in three days.

cases (angina pectoris, for instance) causes a pulsus alternans, or if existing makes it more obvious. So digitalis seems to diminish contractility. (See Fig. 19.)

This clever observation, which I can corroborate, cannot be allowed to be used for general conclusions. The pulsus alternans is certainly not always of one and the same origin, and has to be studied in detail. Moreover, in other cases digitalis may cure a pulsus alternans (See Fig. 20.)

More such cases have shown me that only in some cases *perhaps* digitalis diminishes contractility. We may further ask if perhaps in those cases digitalis acts by vagus inhibition. I *know* that in cases of angina pectoris there is very often a great sensibility of the inhibitory mechanism, as Clifford Allbutt last year presumed! I can only say that I never saw any effect of vagus pressure on pulsus alternans.

Conclusion. — Digitalis increases the strength of the human heart by acting on the heart muscle. Perhaps large doses, or in appropriate cases even small doses, may have an opposite effect (by acting on the vagus?).

III.—*Tone.*

The influence of digitalis on the tonus of the heart muscle is often misrepresented. In small doses it causes, independently from any slowing, an

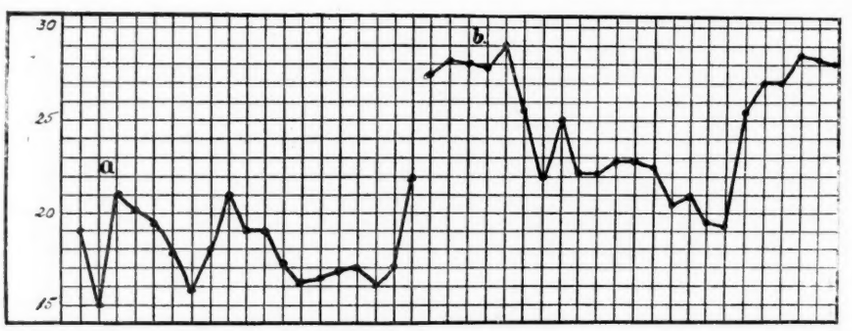


Fig. 9.—*a*, Irregular before digitalis; *b*, more irregular after digitalis (3 grams in four days).

increase of the systole to both sides, a deeper diastole, a complete systole. The researches of Cushny and those of Gottlieb and Magnus do not permit any doubt upon this point.

In large toxic doses only, such as are never used therapeutically, the diastolic relaxation of the heart decreases, which goes so far as to cause the so-called systolic arrest of the

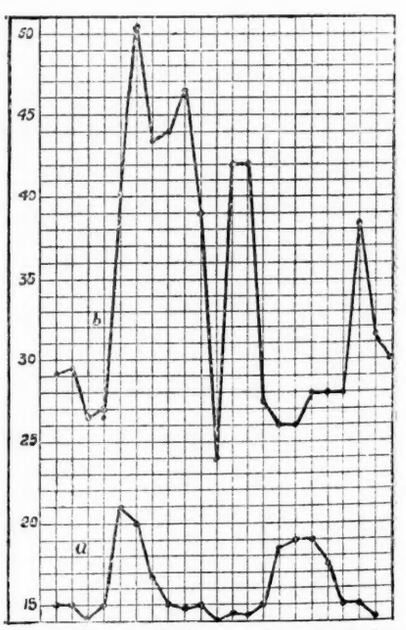


Fig. 10. — Nephritis. *a*, Irregular before digitalis; *b*, after digitalis (3 grams in infusion in eight days).

heart. Whether this is a maximal increase of tone—a property of muscle very poorly known —or some other process of shrinking quite apart from tonus, we do not

know. So we are not allowed to say that digitalis, in doses used at the bedside, acts chiefly on tone, and should be given only or chiefly in cases of "loss of tone." The great effect of digitalis in dilated hearts may have other causes, as we will see presently.

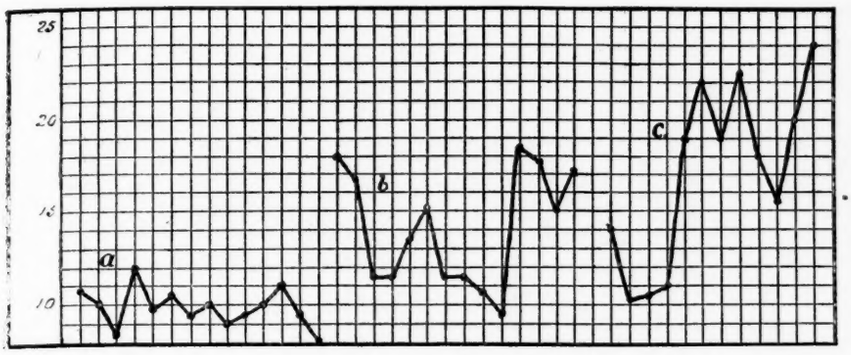


Fig. 11.—Arrhythmia perpetua (quick form). *a*, Before digitalis; *b*, after 1 gram of digitalis (great improvement); *c*, after 2 grams in four days.

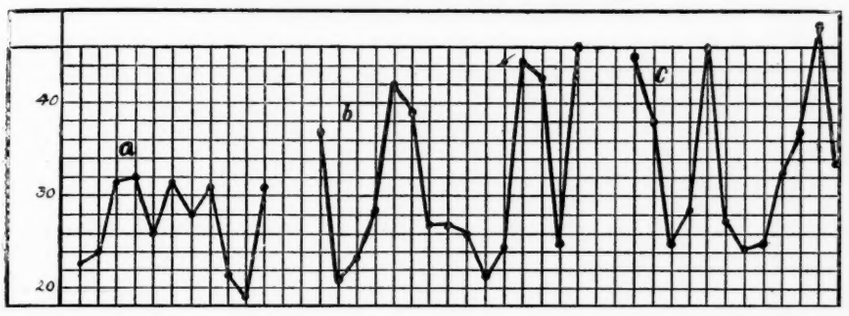


Fig. 12.—Arrhythmia perpetua (slow form). *a*, Before digitalis; *b*, after two days' digitalis (pulv., 0.3 pro die); *c*, after eight days' digitalis.

Conclusion.—At present we have no right to ascribe to digitalis a special effect on tone—a property of heart muscle of which as a matter of fact very little is known.

IV.—*Conductivity.*

The facts concerning the important quality of heart muscle to conduct the stimulus from one part of the heart to any other are:

1. Stimulation of the vagus often diminishes conductivity.
2. Digitalis has the same effect. V. Tabora demonstrated that with vagi intact this effect was obtained by small doses; much larger doses were required after cutting the vagi.
3. In many heart patients digitalis lengthens the interval between auricular and ventricular beat, and may cause partial heart-block.

From experiments we may conclude that our therapeutic doses act mainly by their influence on the vagus. In such cases where conductivity is already impaired, digitalis may do harm, as I predicted as long ago as 1898, and was proved afterwards by many observations.

The effects of digitalis on heart and circulation being very numerous, we have to reckon with the possibility of a bettered circulation causing a better nutrition of the heart muscle and secondarily improving conductivity and other qualities of the heart. In this way, perhaps, cases in which we saw partial heart-block cured by digitalis may be explained.

Conclusion. — Digitalis often causes a decrease of conductivity in the human heart, mostly in large doses, or in hearts where conductivity is already impaired, giving rise to a longer A—V interval, dropping of ventricular beats, and partial heart-block. This effect has to be ascribed mainly to vagus inhibition, partly to acting on the heart muscle.

V.—*Excitability.*

Strictu sensu excitability is the quality of being susceptible to stimulation. Experimentally it is measured by the weakest stimulus still effective. Too often in older experiments excitability was measured by the mode or strength of reaction. Only few experiments have been made in our dominion keeping in mind this stricter sense of excitability. Engelmann, Sherrington, and others gave the example. Brandenburg, Straub, di Cristina followed, and showed that by digitalis the excitability of the heart decreases, the heart muscle becoming insensible to weak stimuli that caused extra-systoles before digitalis. So digitalis may regulate a heart by preventing the occurrence of extra-systoles. At the other side large doses increase the excitability of the heart, cause a quick rhythm and the

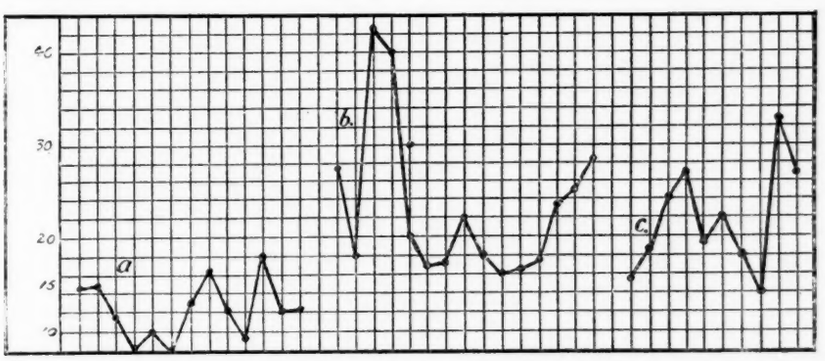


Fig. 13.—Arrhythmia perpetua (quick form). *a*, Before digitalis; *b*, *c*, after digitalis.

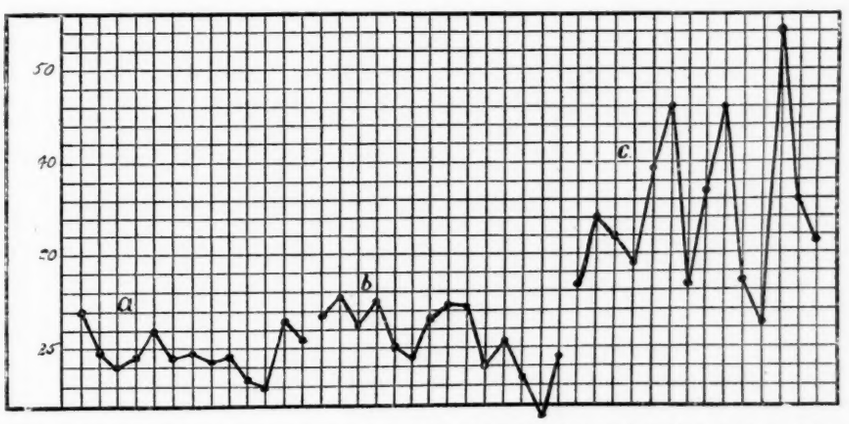


Fig. 14.—*a*, Before digitalis; *b*, after one day's administration of digitalis (0.4 infusion); *c*, after four days of digitalis (1.6 infusion).

occurrence of extra-systoles and other arrhythmias by heterotopic stimulation. As to the origin of these effects

we know only that vagus stimulation may diminish excitability (Engelmann) and that the large doses act on the heart muscle (Gottlieb and Magnus). But a more minute study of these phenomena is most desirable.

In man we find the same effects as in experiment. Large doses may, as is well known, in some cases cause irregularities by extra-systoles, sometimes occurring at regular intervals, thus causing a sort of bigeminal heart action (Fauconnet). But in small doses it may splendidly regulate the heart-beat by preventing extra-systoles. In

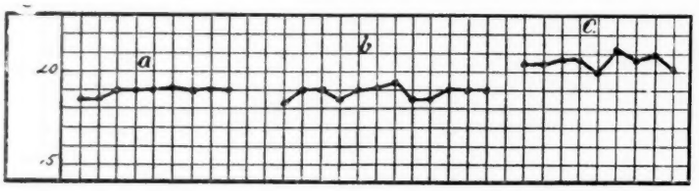


Fig. 15.—*a*, No effect of five days of digitalis; *b*, no slowing, no irregularity; *c*, very little effect after seven days.

these last years I have cured a good many patients with very troublesome extra-systoles, as well with diseased as with perfectly healthy hearts, by very small doses of digitalis only. Some of such cases I will show you. (See Figs. 21 and 22.)

Such cases show the marvellous influence of a very small quantity of digitalis in diminishing the excitability of the heart muscle, and open quite a new field to treatment of these often misunderstood disturbances of heart action. Whether this is by vagus or muscle action of digitalis I cannot say—I only mention the inefficacy of vagus pressure in these cases, so that an action on the muscle is the more probable.

It would be pleasant to dwell upon the inefficacy of digitalis in some cases of extra-systoles, and to discuss its effect on other forms of irregularity, such as tachycardias, but this would take all the time of this morning, and a good deal of work has still to be done in analysing these arrhythmias. So I will limit myself to this

Conclusion—In very small doses digitalis diminishes the excitability of the heart muscle, thus preventing the occurrence of extra-systoles. Larger doses may, in appropriate cases, give rise to irregularities by extra-systoles (bigeminy) by raising the excitability or favouring the formation of heterotopic stimuli. These facts are in accordance with experimental results, and probably due to action of digitalis on the heart muscle.

VI.—*Vascular Effect.*

The influence of digitalis on the vessels, the distribution of the blood and arterial blood pressure is a large problem in itself. Well-established facts are: Most of the digitalis bodies have a vaso-constrictory effect on the splanchnic system, giving rise to greater filling and higher pressure in the arterial system. Digitoxin narrows the peripheral arteries also.

In man blood pressure is raised by digitalis. But the unravelling of the different factors of this rise of pressure is at present simply impossible. How far the stronger action of the heart, a narrowing of the splanchnic area, a constriction of peripheral arterioles comes into play we do not know. A further study of the distribution of the blood in man is badly wanted; the only point to which I want to draw attention is that no full insight will be acquired as long as we have not a reliable instrument to measure the lumen of the arteries. With an instrument as Oliver constructed, but more reliable and more accurate, we might get some notion of the reciprocal influence of peripheral and splanchnic circulation. A further study of each component of digitalis and allied drugs might lead to a rational use of these bodies in different conditions.

However poor our real knowledge of these conditions in man may be, we yet may say that there exists a vascular action of digitalis in man. Not only the analogy with experiments in mammals may be called in, but I think every practitioner has experienced the curious fact that one may *feel* at the radial pulse whether digitalis is given or not. It is not only blood pressure which gives this curious sensation of the digitalis pulse; I think it must be the condition of the wall of the artery altered by digitalis.

Sometimes we may observe even a very strong contraction of the arteries as far from the periphery as the radial and the brachial pulse. I remember very well the case of a lady, in a very bad condition by exhausted and diseased heart, in which a desperate dose of digitalis,

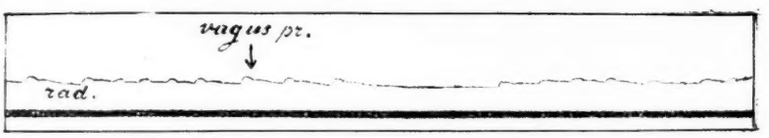


Fig. 16.—Arrhythmia perpetua; effect of pressure on right vagus nerve.

given as an enema, caused the radial pulse to disappear by constriction of the arterial wall, the throbbing carotids being filled to a maximum, and the heart working strongly against a very high blood pressure in the aorta, yet not succeeding in pushing a pulse into the peripheral vessels.

So we may safely conclude: Digitalis in experiment as well as in man has a narrowing influence on the arteries. Further investigation will have to decide which part this vascular influence plays, and how far its occurrence may be provoked or avoided in different cases.

Overlooking the many and manifold effects of digitalis, as far as they may be traced in man, we find a wide field of action of this unique drug. Acting on the vagus, it pulls the reins of the heart; acting on the heart muscle, it is a most useful whip, at the same time providing it with food by bettering the circulation. Slowing the heart, it makes it irregular also. This slowing gives the heart an opportunity of resting, so secondarily improving contractility, conductivity, excitability. By primary action

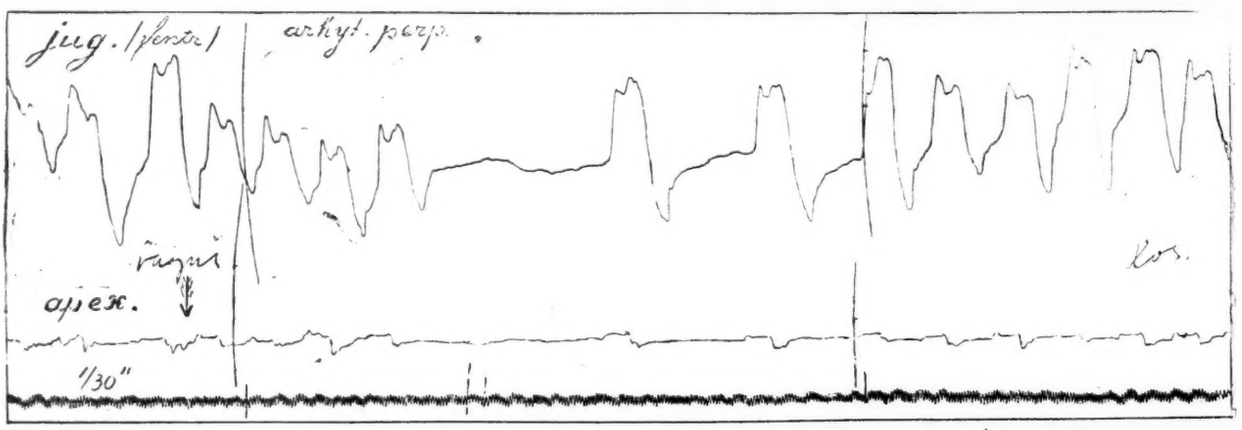


Fig. 17.—Positive venous pulse in case of arrhythmia perpetua; effect of pressure on right vagus nerve at the neck.

it increases its strength, regulates its rhythm by depressing excitability and conductivity. In large doses it may increase excitability, causing extra-systoles, perhaps diminish contractility, by causing long pauses do harm to the circulation. All these influences work in a different intensity according to the dose, the form in which given, and the conditions of the heart. How will it ever be possible to unravel these interfering factors and to build up a rational and trustworthy scheme for using digitalis at the bedside?

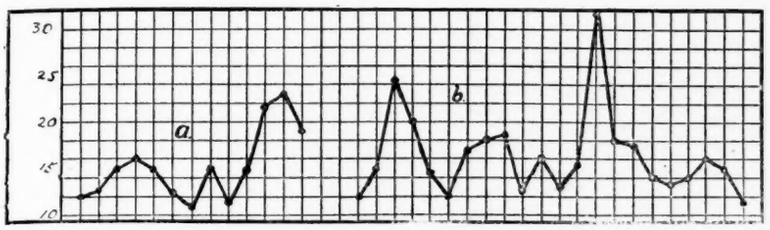
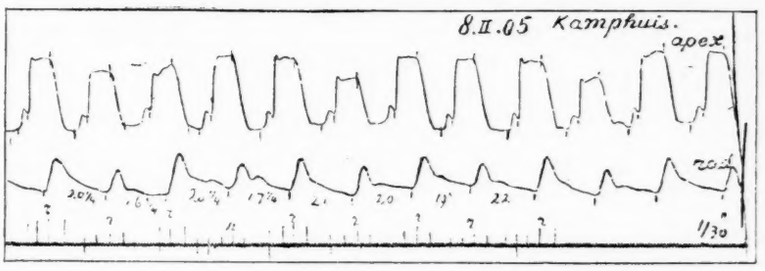


Fig. 18.—Arrhythmia perpetua. *a*, Before digitalis; *b*, after 0·8 digitalis (powdered leaves).

No new ideal is within reach at the present moment. We have to make up our mind, and to come to a preliminary understanding as to where and how to prescribe digitalis.



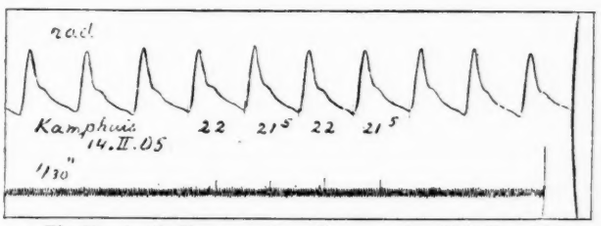


Fig. 19.—Aortic disease, pulsus alternans after digitalis, which phenomenon disappears after stopping it.

The manifold effects of this drug seem to indicate that it may be tried with success in every case where the condition of the heart is cause of a bad circulation or troublesome symptoms. Some among us have discussed whether to limit its use to such cases, where the tone of the heart muscle is amiss, as in the largely-dilated hearts of decompensation in valvular disease. That in such cases digitalis acts so wonderfully we have no right to ascribe to its specific influence on the tone of heart muscle. It is because the conditions for a full display of all its beneficial properties are most favourable here. The rate is too frequent and is slowed, the rhythm is made irregular by abnormal contractions or even by fibrillation of the auricles and it is regulated, the heart is too excitable and made more insensible, it is too weak in its contractions and yields to overfilling and it is strengthened, so that it may empty its chambers. The distribution of the blood is disturbed by low arterial pressure, by splanchnic strain, the lungs are over-filled and respiration made a heavy task, the liver is swollen and hampers the diaphragm, the renal functions are impaired, oedema is impending or present already. The blood supply to the heart itself is insufficient. Here digitalis restores the filling of the arteries, restores the flow of the urine, frees the respiration, nourishes the heart. That digitalis does such splendid work in these cases is because it gets the chance of unfolding *all* its properties here. Whether there is a specific action on the tone of the heart is not known nor proved, nor is there any need for invoking such an effect, whether probable or not. So we have no right to say that it will not be useful in other cases. Of course, in a slow heart the slowing action of digitalis is of no value, may even do harm; where there is no oedema the diuretic action loses its significance, and in high blood pressure still higher pressure is in most cases not desirable,

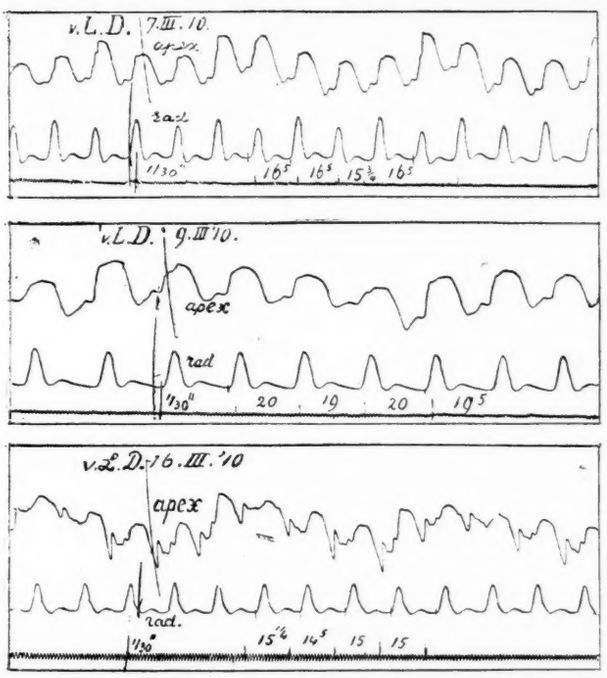


Fig. 20.—Exhausted heart with tachycardia. Quick rate and pulsus alternans before digitalis, slowing and disappearance of alternans after digitalis; after exercise and quick rhythm again no alternans.

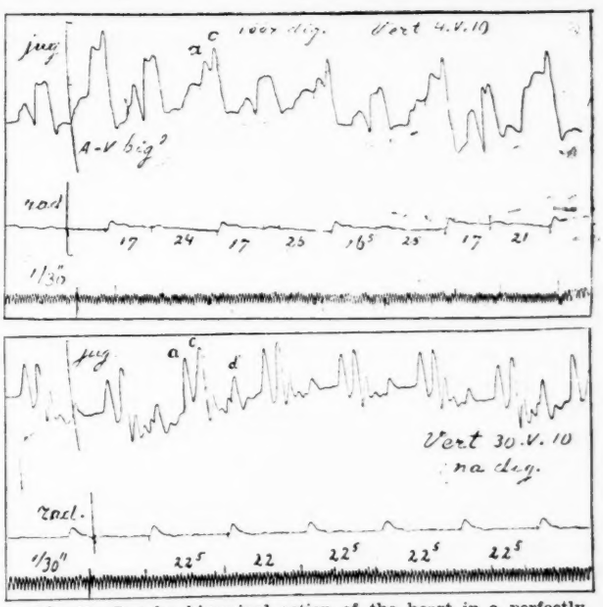


Fig. 21.—Regular bigeminal action of the heart in a perfectly healthy man aged 36 (*a–v* extra-systoles at regular intervals); cured after very small doses of digitalis, returning after three days' stopping of digitalis.

But so many effects has digitalis that in all such cases it may do good. So we come to the conclusion that the many varied properties of digitalis oblige us to try it prudently in all cases where the heart is affected, and not to restrict its use to cases with loss of tone or to cases with quick and irregular pulse.

There is one restriction in my conclusion: Give it prudently. Just as Withering abandoned large toxic doses and prescribed smaller ones to get the diuretin effect only, experience led me to use much smaller doses. Do not push digitalis until impairment of conductivity, or a pulsus alternans, or bigeminal heart action, or long pauses occur. In doubtful cases give very small doses, which may be given for weeks and for months, and reserve your large doses for the cases just mentioned, where there is *periculum in mora*, such as are well known to every physician.

Of course we have to look for better and preciser instructions. A deeper analysis of the action of digitalis

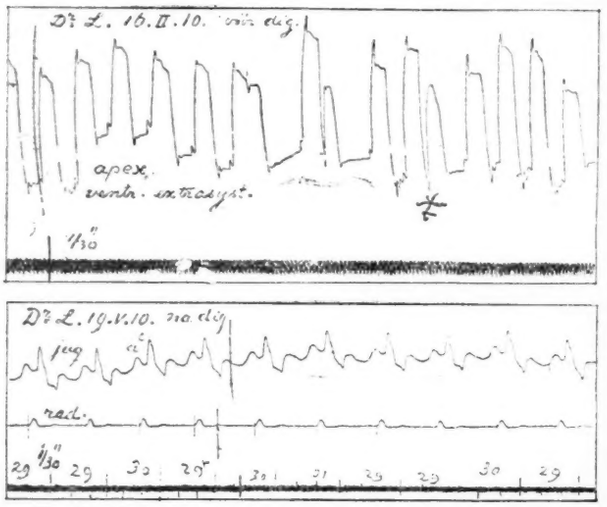


Fig. 22.—Hypertrophied, overstrained heart; irregular ventricular extrasystole of years' standing; refractive to any other treatment, cured by small doses of digitalis.

and its single constituents is needed, and not less is a minute analysis of our heart cases, of the disturbances of heart action and of the conditions of the circulation. In every case we want to know whether the heart, and which of its functions is wrong, whether there is splanchnic strain, overfilling of the lungs, loss of control from the vasomotor centres, so as to know whether digitalis is indicated or not; or perhaps digitoxin had to be given, which contracts the peripheral vessels, or strophanthus, or digitalin, which acts on the splanchnic area only. Along such lines we will have to proceed to further knowledge. But so much I would say—Give digitalis a fair trial in every case.

If ever I should acquire a reputation for treating heart patients with success, it will be from my giving in this way digitalis in cases where authorities and textbooks forbid it!

II.—JAMES MACKENZIE, M.D.Edin., LL.D.Aberd.,
Physician, Mount Vernon Hospital for Diseases of the Chest.

A GOOD many years ago, while inquiring into the nature of heart irregularities, I found that digitalis in medicinal doses could produce different forms of irregular action of the heart, and it occurred to me it might be worth while to make a more systematic study of the effect of digitalis in this respect. In order to qualify myself for this line of observation, I looked up the literature on the action of digitalis on the human heart, and found it far from satisfactory. One authority advocates small doses, and gets his results in a few hours, another authority gets his results from small doses in a few days, while a third finds small doses useless. Nearly all remark on the uncertainty of the drug, due either to the inertness of the preparation or to the capricious action of the drug itself. A great number of different preparations have their special advocates, and new digitalis preparations are being added to the number, each on its advent being heralded with the announcement that at last the real effective preparation, robbed of all disagreeable contents present in the crude drug, has been obtained.

When definite results are obtained, whether beneficial or the reverse, it is rarely that a sufficiently clear account is given which will enable us to recognize the nature of the heart trouble. Even when the dangers of digitalis are described, and it is stated that fatal results may follow, there is an entire absence of any precise indication which would lead the reader to recognize the case or the symptoms that might herald a fatal issue, or the quantity of the drug that would prove fatal.

The inquiry into the action of digitalis on the human heart, pursued when I was engaged in general practice, showed me that it was possible to ascertain with considerable accuracy the manner in which digitalis acted on the human heart, and from the evidence thus obtained certain conclusions could be drawn which explained many of the obscure actions which have given rise to the confusing and contradictory statements in regard to the action of this drug.

When I was appointed physician to the Mount Vernon Hospital for Diseases of the Chest, and given charge of the wards devoted to diseases of the heart, I embraced the opportunity of pursuing the study of the action of cardiac drugs under circumstances far more favourable than when engaged in general practice. I was fortunate in being able to have associated with me Professor Cushny, who has placed his knowledge of drugs at our service, who has guided us in their administration, and who has experimentally tested in his laboratory the efficiency of the remedies we used. To ensure accuracy in diagnosis, Dr. Lewis has kindly examined many of our patients by means of the electro-cardiograph. The minute and careful study of individual cases, and the employment of graphic methods for recording the movements of the heart and vessels, is extremely laborious and time-robbing, and could not have been accomplished without the assistance of Dr. Hulme Turnbull and a number of colleagues who were trained to assist us.

In seeking for a definite standard to guide us in our observations there are two matters which are of the first consideration—namely, to have a clear idea of what is meant by heart failure, and to recognize the true significance of abnormal signs or symptoms. These two matters are often so confused that an abnormal sign, such as a murmur or irregularity, with or without heart failure, is regarded as evidence of "heart disease," and as a defect needing treatment. While carefully noting the presence of abnormal symptoms, we sought for other evidence whereby to estimate the functional efficiency of the heart.

In order to obtain a clear understanding of heart failure, not only for diagnostic purposes but to serve as a guide to treatment, we must have some method for estimating the condition of this functional efficiency. This we do by observing the manner in which the heart maintains the circulation, with the body at rest, and in response to effort. By the first of these observations we estimate what I propose to call the rest power of the heart, and by the second the work power of the heart. When the patient is in perfect comfort while lying in bed, with the circulation maintained efficiently, then we consider that the rest power of the heart is intact. If, however, there be manifest signs of inefficient circulation, when the patient is at rest, as dropsy, dyspnœa, orthopnœa, then there is exhaustion of the rest power. Work power is that function of the heart which enables it to increase its force when an effort is made, accommodating its activity to the varying demands made upon it. The amount of work power varies with each individual. It is necessary to have a standard by which we may test this work power, and this we obtain by observing the amount of exertion the individual can undertake with comfort. Each individual knows within certain limits how much he can do, and exhaustion of his work power is made manifest to him by the occurrence of some disagreeable sensation.

The first evidence of heart failure is, therefore, the premature exhaustion of the work power. This exhaustion is recognized by discomfort arising in the performance of an effort he was wont to undertake with ease. The sensations vary in different individuals and include breathlessness, consciousness of the heart's action (palpitation, irregular action, fluttering sensations), gripping of

the throat or chest, a sense of exhaustion, a feeling of suffocation, or actual pain.

I am rather insistent upon the careful recognition of the patient's sensations, as the meaning of these sensations, especially their relation to heart failure, has not received that attention from the medical profession which is their due, nor has the importance of these sensations been sufficiently realized. By the time objective signs of heart failure are manifest the exhaustion of the work power has made considerable progress; the objective signs to which I refer are dyspnoea, dropsy, cyanosis, etc. Such signs as murmurs, irregularities, or changes in the size of the heart are not necessarily signs of heart failure, for these may be consistent with such an amount of work force as to call for no form of treatment. In order to test the work force quantitatively some simple standard of exertion is employed, as, for example, the ascent of a given number of steps, and a note is made of the patient's sensations, and records of the circulatory and respiratory movements before and after the exertion are obtained. Improvement can then be found to be associated with a number of collateral signs, and may be noted on the chart to which I shall shortly refer.

The method of taking the work power as standards, not only in carrying on such an investigation as I am describing, but in everyday practice, will be found of great value, especially when some abnormal phenomenon is present, the nature of which is not understood. The more usual method of judging the heart by studying each case from the point of view of compensation and decompensation, or failure of compensation, is unsatisfactory, for the idea conveyed by these terms is of insufficient definiteness to be of value, while the sense in which they are commonly used is actually misleading.

In order to facilitate the taking and preservation of accurate records, we have prepared a special chart, in which spaces for the more salient features are filled in the routine of daily examination. A glance at the chart reveals its object, and I need only dwell on a few points. It omits a reference to the changes in rhythm, for the graphic records are kept on a separate sheet. These records are peculiarly valuable, as they form a permanent register of the manner in which the drug affects the heart, as in the instances of slowing of rate or of the production of some characteristic irregularity. Taking a tracing continuously for ten or fifteen minutes has been of special service in two ways. The first effect of digitalis often consists of an *occasional* alteration of the rhythm of the heart, and in observations limited to a few minutes the alteration may escape detection. The occurrence at rare intervals of an extra-systole or a dropped beat, as the result of partial heart-block (a not uncommon occurrence with drugs of the digitalis group) may be instanced. In long records taken immediately after exertion we obtain the most valuable indications. We have found that the peculiar action of such a drug as digitalis is first detected as the heart slows from the rapid rate following upon exertion. These reactions vary in different patients, and in some patients they are of a varied character; but they are frequently fugitive.

The column for recording the patient's sensations is of particular value in view of what I have said in regard to the estimate of the condition of the work force, and so far it has been instructive to observe the improvement coincident with the changes recorded in the remaining columns.

The blood-pressure measurements are taken by means of a Martin's modification of the Riva-Rocci apparatus, and as far as possible one observer is responsible for the observation in each case. The reason for this is that there is a distinct difference in the ability of different individuals to appreciate the earliest reappearance of the pulse after it has been obliterated, and for purposes of comparison it is better to avoid the possibility of variation due to this cause. While we only note what is called the systolic pressure in each case, we recognize that the pressure at which the first pulse beat is observed does not represent the actual systolic pressure within the artery; but as a definite point of observation it is of value, and the most reliable which our present methods afford. We are careful to exclude the records of the blood pressure when the pulse is continuously irregular, inasmuch as the pulse beats are always varying in strength, and no satisfactory conclusion can be arrived at from the strongest or weakest beat. While no doubt a record could be obtained which might possess some value, yet, in view of the fact that such record would give a seeming reliability which in reality it does not possess, we reject such observations lest they should tend to mislead.

In noting changes in the size of the heart we use only percussion, as being on the whole the most convenient and the most reliable. I had used the *x* rays for some years, but they did not render the help I had hoped for. A further inquiry into the use of the orthodiagraph and photographic methods gave me the impression that the results were not sufficiently precise for my purpose, and I was therefore forced to content myself with percussion in preference to methods which are troublesome and laborious, and which do not yield sufficiently accurate results.

Another feature which calls for a short reference is the space left for noting changes in the sensibility of the external body wall. I had long observed that in some forms of heart failure the tissues in certain regions become tender on pressure, and I found a distinct relation between the degree of heart failure and the extent or severity of the hyperalgesia of the skin muscles, mammary gland, and other tissues in the external body wall. In fact, the first sign of improvement in the patient's condition is nearly always the diminution of the tenderness of these areas. The most frequent sites of manifestation are beneath the left breast, the breast itself, the pectoralis major muscle where it forms the anterior wall of the axilla, the sterno-mastoid and trapezius muscles on the left side, and the skin covering these. While such areas can be correlated with definite changes in the heart, equally striking symptoms are presented when the liver is enlarged, and the marked diminution of the hyperalgesia of the tissues of the external body wall covering the liver always accompanies a decrease in the size of that organ.

The form of drug and method of administration we employ are those which are most commonly used by the practitioner in his everyday work. We felt that the employment of hypodermic injections or intravenous injections—methods of great value, and which we may later and under special circumstances employ—would not result in that usefulness to the general practitioner which administration by the mouth ensures. The preparation of digitalis used is one easily procured and most commonly employed in practice—namely, the *B. P.* tincture. I have found it very reliable. The extractives which go under such names as "digitalin" and "digitoxin" we have not used, because Professor Cushny pointed out that none of these glucosides are sufficiently definite to be recognized, that a preparation like the tincture contains the different glucosides, and that there is no reason to suppose that the special preparations have any distinctive advantage.

In the use of the drug we are careful to eliminate as far as possible adventitious circumstances, such as rest and diet, in our consideration of its effect. For this purpose the patient is allowed to remain at rest for a period before the drug is administered. In this way we also study the effect of rest in treatment; and, as is well known, it is a very powerful remedy in a great variety of cases.

We attempt the comparison of effects of different doses of the same drug, and of different drugs on the same individual. In suitable cases, where we get a definite and well-recognized reaction from digitalis, we note the amount of the drug taken to produce the first physiological effect, and the quantity that maintains the heart in the condition best fitted to carry on the circulation efficiently. It may be found that a given quantity of the drug has slowed the pulse down from 100 to 60 beats per minute, and, coincident with this slowing, there has been an improvement in the patient's condition. If the drug be pushed further, the pulse may become still slower in its rate, but the patient may not feel so well, being conscious, it may be, of the thumping of the heart, or of breathlessness. Under such circumstances we gradually diminish the dose till we find the quantity which keeps the rate such that the patient feels most comfortable. It is very remarkable how reliable a patient's sensations are in this matter—so much so that we are often guided only by him as to the quantity of drug which he continues to take. When digitalis produces nausea, or for other reasons we let the patient escape from the influence of the drug, and then substitute some other drug, as

strophanthus, squills, helleborein, and carefully push the drug until the first physiological effect is produced, or the patient experiences an improvement in his condition. By this means we obtain a knowledge of the reaction of the patient to the different drugs, and find out which, for him, is the most beneficial. We are thus enabled to form an opinion of the properties of the different drugs, the most appropriate doses, and their relative efficiency in treatment. The drugs are then tested and physiologically assayed.

There are other features in heart failure which call for further inquiry, such as cyanosis and the nature of different forms of breathlessness. We have attempted in several ways to deal with those questions, but at present we find our methods insufficient to cope with the subject, and we hope that we shall be able to evolve methods which will assist in these inquiries.

III.—H. H. Turnbull, M.D.

THE THERAPEUTIC USE OF DIGITALIS.

The following observations are based on work done in Dr. Mackenzie's clinic at Mount Vernon Hospital. In order to obtain the full effect from the use of digitalis and its allies it has been found necessary to push the drug until definite symptoms are produced, and in this inquiry the amounts which were necessary to produce effects, and the symptoms thus produced, were noted, attention being paid to the varying reaction of different types of cardiac lesion to the drug. The usual dose employed was ♏ xv of the tincture four times a day, and it was found that the average quantity taken before symptoms were produced was about 6 drachms, though the cases varied within rather wide limits, the minimum being 3¾ drachms and the maximum 11¼ drachms. If a rapid effect was desired, larger doses were employed, but if too small doses are given many cases fail to show any effect whatever, and frequently cases which had been treated on doses of ♏ v–x three times a day without benefit, were rapidly influenced by full doses.

Subjective Symptoms.—These varied slightly, but were broadly constant, and no relation could be traced between them and the nature of the cardiac lesion. The most constant symptom was nausea, some degree of which was produced in every instance but one, and was accompanied by loss of appetite and frequent vomiting. Headache was very common, being in fact frequently the first, and in one case the only, cause of complaint, and with it some patients complained of giddiness and a general malaise similar to that of sea sickness. Diarrhœa was only produced in one instance. The amount of urine was not definitely increased in cases which were not dropsical, and indeed in most cases at the time of the appearance of subjective symptoms it was usually diminished, probably owing to the small amount of fluid taken while the nausea was in evidence.

Time Required.—The time required for the production of the full effect varied in different patients, but if very rapid action was desired larger doses, up to 2 drachms a day, of tincture of digitalis were employed, and with such a dose sickness and beneficial cardiac effects can be produced in thirty-six to forty-eight hours. If only 1 drachm a day be given, four to eight days are usually required for a satisfactory result.

Cardio-vascular Effects.—Some cases showed no definite effect at all, the pulse not being slowed, although the drug was pushed to the point of vomiting. These were all cases of senile cardio-sclerosis; all the rheumatic hearts showed a reaction. Usually the pulse was slowed, and, as a rule, the respiration was also slowed a little; the pulse slowing, and, indeed, all the reactions being especially marked during the period about three minutes after exercise, when normally the pulse slows down after the initial quickening caused by the exertion. This seems to be the period of maximum vagus activity, and most of the effects produced by digitalis have been explained as due to an increased control from vagal stimulation. This pulse slowing occurred in three separate ways:

1. General slowing of the whole heart.
2. Sinus arrhythmia, in which the pulse is irregular owing to a more or less rhythmical variation in the rate of the whole heart, the variation being due almost entirely to alterations in the length of the diastolic period.
3. Varying degrees of heart-block.

The first two types usually occurred in rheumatic hearts; non-rheumatic showed, as a rule, little slowing, and in none was any marked degree of sinus arrhythmia produced. Sinus arrhythmia showed best about three minutes after exercise, and in cases in which it was present before the administration of digitalis this drug caused it to become much more marked. In these cases it did not accurately follow the respiratory cycles, as is usually the case in the arrhythmia of young people, but each pulse phase might continue during more than one respiratory cycle, and the pulse did not become regular when the breath was held.

3. *Heart-block.*—In cases in which, owing to damage of *a–c* bundle, the period required for passage of an impulse from auricle to ventricle over the bundle is longer than the normal 0.2 second (*a–c* interval prolonged), digitalis very frequently further increases this difficulty until some of the impulses fail to pass and a condition of heart-block is produced, at first partial, and finally, if the drug be pushed, perhaps complete with blocking of all auricular impulses. This is probably due to a depression of conductivity in the bundle tissue by excessive vagus stimulation, and, like all other vagus effects, is most marked shortly after exercise. In some cases in which the *a–c* interval is not noticeably prolonged, there may be sufficient damage to the bundle to allow of the production of heart-block by digitalis, so that this becomes one of the most important conditions to be observed during the administration of this drug and its allies, and the length of the *a–c* interval must be carefully watched when these are being pushed. This action on conductivity seems to be the chief reason for the slowing which is got in cases of auricular fibrillation, in which, as has been pointed out by Dr. Mackenzie, digitalis finds its chief use. In these cases the pulse can often be kept at any desired rate by giving or withholding the drug, and in some full doses produce a practically regular pulse of about 40, the occasional premature beat being followed by a pause equal in length to that between any two preceding regular beats, which suggests that the condition is one of complete heart-block. These cases frequently have to continue taking the drug for considerable periods, one man being now under observation who is able comfortably to do light work while taking 45 minims of tinct. digitalis daily, which keeps his pulse-rate down to about 46 to 48 per minute. He has been experimenting himself to find the proper dose, and finds that he is most comfortable while taking this amount.

Extra-systoles.—In cases in which extra-systoles are already present, the administration of digitalis is usually without effect on their frequency, though occasionally they appear to diminish under it. However, in some cases where extra-systoles are very frequent and there is some cardiac disability, simple rest will cause a great diminution in their number, and here it seems likely that the diminution is merely due to a better and therefore a quieter action of the heart. Digitalis may act in the same way in these cases, but in no case have we found extra-systoles entirely to disappear under its administration. In three of our cases, however, in whom no extra-systoles were present the administration of digitalis produced them—one case showing extra-systoles while at rest in bed, but the others only in the slow period two or three minutes after exercise. In two cases extra systoles were interpolated, and in the other ordinary ventricular extra-systoles, occurring after every other normal beat and followed by a compensatory pause. They gave rise to no disability, though one of the patients was unpleasantly conscious of the thump produced by the larger beat following the extra-systole. They disappeared rapidly after the drug was discontinued, in one case even disappearing in spite of the continued exhibition of the drug. All these cases showed marked sinus arrhythmia and the extra systoles appeared during the slow period.

Action on Dilatation.—In two cases, both of *auricular* fibrillation, a very marked diminution in the size of the heart, as determined by percussion, was produced, and in one or two slight diminution, but in most cases no very definite change was found. However, nearly all the cases were chronic ones, in whom there had been no sudden breakdown, and no doubt the enlargement of the area of cardiac dullness was chiefly due to hypertrophy, and only in a minor degree to dilatation which could be recovered from. In the two cases which showed marked diminution the heart failure had been rapid, and there was considerable dilatation which disappeared under digitalis. It was

found that the dullness often varied a little from day to day, quite apart from any treatment, so that only very definite and persistent variations were taken into account, but what little change there was after treatment with digitalis was always in the direction of diminution.

The Febrile Heart.—In two cases in which there was marked heart failure combined with a febrile condition, digitalis produced no effect, though pushed to the production of vomiting. In no case was any rise of blood pressure found to result from the pushing of digitalis; in fact, there was frequently a fall of 10 to 12 mm. of mercury. However, it was noted that in two cases, in which the heart began to fail while under observation, and taking no drugs, the blood pressure rose about 12 mm., and the fall which may occur under digitalis is probably due merely to the increased efficiency of the circulation which results from its use.

Strophanthus.—The effects produced by tincture of strophanthus were similar in every respect to those obtained by the use of digitalis, except that vomiting seemed to be less common than diarrhoea, which in many cases was the first sign of the full dose. This diarrhoea was severe in several of the cases, and did not cease when the drug was omitted, though it readily yielded to treatment with castor oil, or castor oil and opium. Although the tincture of strophanthus employed was twenty times as powerful as the digitalis when tested on the frog's heart the dose necessary to produce effects was usually larger. In some cases the physiological effects were seen after only 4 to 6 drachms, but in several of the others considerable tolerance was shown for the drug, and as much as 2 drachms a day was given without causing any symptoms other than the maintenance of a slow pulse-rate. In one case half a drachm of tincture of strophanthus was given every four hours to a case of auricular fibrillation with great dyspnoea, marked cardiac dilatation, and oedema of the lungs and lower limbs, the pulse-rate being 138, and after thirty-six hours all oedema had disappeared, the patient was quite comfortable, and the pulse-rate 52. On the whole, it seems advisable to use doses of not less than 1½ to 2 drachms of tincture of strophanthus per day if a rapid good result is desired.

Tincture of Squills.—This is one and one-third times as strong as the digitalis, and was used in doses of mxv four times a day. Though results similar to those of digitalis were obtained on the heart, no general symptoms, except slight malaise, were met with. In one case squills produced, first, sinus arrhythmia, and later a marked degree of heart-block during the slow period following exercise.

The special points which we regard as important in the administration of digitalis are:

1. Full doses are necessary to produce the effects of the drug, and unless it is pushed no result may be obtained in cases which would at once react to large doses.

2. There is no danger in pushing the drug if the type of case is taken into consideration and the results watched. In most of our cases the patient stopped the drug himself owing to the increasing nausea, and the only cases likely to show bad effects are those with damaged auriculo-ventricular bundle in whom heart-block may result. Several cases have been treated in the out-patient department with doses of mxv three times a day with excellent results.

3. Raised blood pressure is no contraindication to the use of digitalis, and is often due to some secondary effect of the heart failure.

IV.—J. D. Windle, M.D.Vict.

DEMONSTRATION.

Dr. J. D. Windle completed the opening of the discussion by a demonstration of tracings showing the action of digitalis in cases of nodal rhythm and auricular fibrillation.

DISCUSSION.

Sir Lauder Brunton (London) said it was just forty-five years ago that he began to collect digitalis leaves for an investigation into its action. Six months later he saw a case of digitalis poisoning which showed quick beats with interpolated slow ones, slow beats with an interpolated quick one, and then slow beats. Like Professor Wenckebach, he attributed this condition chiefly to vagus stimulation, but he also took into consideration another possible factor—namely, accelerating nerves. He thought that clinically an estimation of the relation between power of the heart and arterial tension was very important. The best method of doing this at present was to compare the arterial tension as ascertained by the sphygmomanometer with the form of sphygmographic tracing. He thought it very important to watch the action of digitalis on the blood pressure in cases of gouty kidney with high pressure, as otherwise danger might occur from too great a rise. He said that the heart was a double organ—right and left—and symptoms of discomfort and dyspnoea might arise from weakness of the right ventricle whilst the left ventricle was perfectly healthy. He thought that what clinicians wanted from pharmacologists was a knowledge of the comparative proportion of cardiac stimulants like digitalin, and of vascular dilators like digitonin, in each preparation, and also what drugs had a selective action on the right ventricle and which upon the left.

Dr. W. T. Ritchie (Edinburgh), who discussed the coupled rhythms (continual bigeminy) of the heart which might appear after the administration of digitalis, said that under the influence of digitalis a coupled rhythm of the ventricles might become superadded to a perpetual arrhythmia of the ventricles associated with auricular fibrillation. Cases without perpetual arrhythmia, however, might also develop a coupled rhythm after this drug had been administered. These facts were well known, but the mode of production of the coupled rhythms was less clearly understood. The speaker and Dr. Cowan had been considering this problem, and had come to the conclusion that all coupled rhythms (except some of those in auriculo-ventricular heart-block) might be induced by one mechanism. Digitalis lessened the frequency of the heart's rate, and the consequent prolongation of diastole led to increased intracardiac pressure; and it was suggested that whenever an enfeebled heart was unduly irritable in an abnormal site any excessive rise of intracardiac pressure might produce a regularly recurring premature systole originating in the irritable area.

The clinical evidence in favour of this theory was supported by that obtained in experimental research. Knoll and Hering had demonstrated that extra-systoles might be produced by constriction of the aorta or pulmonary artery, or by reflex stimulation of the vasomotor system. In Pletnew's experiments, stimulation of the vasomotor centre induced extra-systoles, singly, or in groups, or a continual bigeminy; and Pletnew also recorded continual bigeminy as a result of constriction of the aorta. Rothberger and Winterberg concluded that extra-systoles might originate in either the right or the left heart according as the pulmonary artery or the aorta be narrowed. There was therefore experimental evidence to demonstrate that single extra-systoles or a continual coupled rhythm might be induced whenever there was a discrepancy between the functional capacity of the heart and the work which it was called upon to perform. In the human heart excessive intracardiac pressure might be produced in many ways, but it would necessarily accompany synchronous contraction of auricle and ventricle or any undue prolongation of diastole. Dr. Cowan and the speaker found that both synchronous contraction of auricle and ventricle, and likewise undue prolongation of diastole, might be followed either by a single extra-systole or by a coupled rhythm. In auriculo-ventricular heart-block with mitral disease and an enfeebled heart, they found that synchronous contraction of auricle and ventricle might be followed by an extra-systole of the ventricles. When auricle and ventricle contracted synchronously the usual mitral reflux was lessened, and the auricle could not empty itself of its contents. The residual blood in the left ventricle was excessive, and the diastolic influx from the over-full left auricle quickly raised the intraventricular pressure to such a degree that a ventricular extra-systole ensued. In the case of heart-block recorded by Vinnis, the continual bigeminy of the ventricles might be explained by the fact that an auricular systole seemed to coincide with the first ventricular beat of each couple. In other instances synchronous contraction of auricle and ventricle—as on the occurrence of a ventricular extra-systole—might be followed by a single extra-systole originating in the auricle or by a continual coupled rhythm in which both auricle and ventricle participated.

Undue prolongation of diastole might cause a single extra-systole or a regularly recurring extra-systole. The latter event was shown in Fig. 93 of Mackenzie's work, *The Study of the Pulse*. Prolongation of diastole entailed excessive intracardiac pressure, and, if the heart were enfeebled, neither the auricles nor the ventricles might be able fully to expel their contents, and the subsequent diastolic influx from the overfull auricle would rapidly raise the intraventricular pressure so high that the enfeebled and irritable ventricle initiated a premature extra-systole. After the premature beat the ventricle would not again become overdistended, nor would it again contract, until the second sinus stimulus reached it in the usual manner. But with the lengthened diastole the ventricle would again become overdistended, and the coupled rhythm would continue.

The coupled rhythm which became superadded to a perpetual arrhythmia under the influence of digitalis was not due to cessation of the auricular fibrillation—for the latter still persisted—but probably might be explained by a mechanism similar to that of a coupled rhythm occurring in a heart with a fundamental and regular sinus rhythm. The slowing of the ventricular rate under digitalis might be due in part to depression of conductivity in a damaged auriculo-ventricular bundle under the influence of the drug, or to increase of the arterial blood pressure, as well as to other factors. But the lessened frequency of the ventricular rate, however produced, entailed prolongation of diastole, and therefore increase of intracardiac pressure; and, as already stated, the first beat after a prolonged diastole might be succeeded by a single extra-systole, or the prolonged diastole might be followed by a coupled rhythm. In the coupled rhythm superadded to perpetual arrhythmia under the influence of digitalis it was not yet known whether the second beat of each couple yielded invariably an electro-cardiogram which was, according to Einthoven's nomenclature, "atypical." If that were so, the coupled rhythm of the ventricles in perpetual arrhythmia was due to essentially the same mechanical factors as those of a coupled rhythm in which a ventricular extra-systole recurred regularly in a heart with a fundamental and dominant sinus rhythm.

Sir Clifford Allbutt (Cambridge) said that had he not received a kind request from the Chair he should not have ventured to speak, as some time must pass before such materials as the previous speakers had laid before them could be properly digested. For his own part, he felt unable to say anything to the point until he had had the published records under his eye, and been able to consider them with line and rule. But he was glad to have the opportunity offered to him of expressing in the strongest terms, he felt sure he might say on behalf of the audience, their sense of the admirable methods in which the records and studies had been laid before them. There could be no better illustration of the development of that quantitative appreciation of clinical phenomena by which only their knowledge could be placed on a firm basis. He might, perhaps, venture to remark on what had passed that his own opinion was in favour of the alleged differences of larger and smaller doses of digitalis in their effects upon the myocardium and the vagus respectively. Concerning the large doses of digitalis which had been mentioned, as if it were easy, if the dose were ill borne, to retrace one's steps, he would urge that it was not always so easy. In some cases of vomiting after digitalis this distressing and perilous symptom did not subside on suspension of the drug; so that any trifling in a serious case with doses which might for the individual prove excessive was to be deprecated. The best way to avoid nausea was to give the drug after a meal, and to ice the draught. Administration per rectum did not avoid this disorder. On one more factor in many heart cases he would dwell for a moment, as in his experience it was too frequently neglected, namely, the factor of emphysema. As some speakers had said, for the present they had to estimate cardiac values by symptoms; they had no quantitative tests. Now in persons past middle life, emphysema commonly entered into the conditions, probably, in the speaker's opinion, because of atheroma of the bronchial arteries. However this might be, the coincidence was frequent, and in every case should receive particular attention, as it added considerably to the embarrassment of the patient, weighed down the prognosis, and baffled the treatment. He would not, of course, presume to detain them by any advice as to the methods of estimating this emphysematous constituent; it was sufficient for him to emphasize the frequency and importance of a factor too commonly overlooked or slighted. It happened to him not infrequently to see cases of alleged cardiac disease in which the cardiac factor was, beside the emphysematous, almost negligible.

Professor Wenckebach, in reply, said that he thought that the difference between his clinic and that of Dr. Mackenzie was not so great as might appear at first sight. While in some cases he recognized the need and utility of large doses of digitalis, in other cases he had had success with small doses. On the Continent there was a great and exaggerated fear of digitalis. He himself thought that large doses should be confined to hospital work, and safeguarded by careful observation, such as Dr. Mackenzie gave.

Dr. Mackenzie, in reply, reiterated that he thought the dangers exaggerated. He gave out-patients large doses, telling them to stop if sickness or other unpleasant symptoms developed, and he had never seen ill results.

THE ACTIVE PRINCIPLES OF ERGOT.

By H. H. Dale, M.D.,

London.

In the middle Seventies of the nineteenth century two conceptions of the activity of ergot had been put forward. Buchheim stated that it belonged to the class of "putrid and septic substances." Tauret isolated an alkaloid in crystalline form; an amorphous alkaloid occurring with it he regarded as a physical modification. To these conceptions we have had to return, and regard the activity of ergot and its extracts as due (1) to a specific alkaloid; (2) to certain bases which also arise in the putrefaction of proteins.

1. The specific alkaloid—ergotoxine—corresponds nearly to Tauret's "amorphous ergotinine." It was isolated by Barger and Carr as crystalline salts, and was proved to be the hydrate of the inactive crystalline ergotinine, as was suggested by Kraft, who prepared it independently. It causes the characteristic gangrene and other toxic symptoms of ergot; it also causes contraction of the arteries, uterus, and some other plain-muscular organs, and, in larger doses, selective paralysis of motor effects of the true sympathetic system.

2. Of the amines, which also arise during putrefaction, two have been shown to be concerned in the activity of ergot and its preparations.

(*a*) *p* hydroxyphenylethylamine, produced by splitting off CO_2 from tyrosine. This base has an action similar to, though weaker than, that of adrenine. It therefore causes rise of blood-pressure, being the chief agent in producing the pressor action of many ergot extracts. It produces contraction of the cat's uterus in the pregnant, inhibition in the non-pregnant, condition.

(*b*) β iminazolethylamine, produced by splitting off CO_2 from histidine. This base has an intense action on plain muscle, the uterus in particular being stimulated to intense contraction by minute doses. It causes a fall of blood pressure, apparently due chiefly to dilatation in the splanchnic area. Kutscher also obtained from ergot a base identical with or closely related to this.

The pharmacology being thus fairly clear from the experimental point of view, the subject needs for its complete elucidation careful clinical experiment which will decide whether the therapeutic effects desired of ergot are due to the specific alkaloid ergotoxine, or to the amines from amino-acids, and, in the latter case, which is the important one. It may be that all are needed. If ergotoxine plays a necessary part in the desired effect, only ergot can give us what we want. If, on the other hand, the amines without ergotoxine do what is necessary, then ergot has no proper place in the pharmacopoeia, since these bases can more easily be obtained from other sources.

TREATMENT OF LOBAR PNEUMONIA.

By A. J. Mathison, M.R.C.S., L.R.C.P.,
Wood Green.

[*Abridged.*]

The central fact in this brief paper is the employment of a certain drug combination in 20 cases of lobar pneumonia, with no mortality, but with abortion of 4 of the cases.

The treatment advocated is the administration from the time of diagnosis of a combination of two drugs, each of which has been put forward separately as an efficient remedy in pneumonia—creosote and potassium iodide. There is no novelty in employing either of these separately. The combination alone is introduced as new, just as I introduced it briefly in the Journal in 1906.

No particular local treatment goes with this scheme. I do not myself trouble now about applications to the chest in pneumonia.

I formerly recommended giving my combination in gradually increasing strength, but pneumonia marches so rapidly that I find it better to give from the time of diagnosis the following prescription, and to minors one of strength proportionate to their age. The four-hourly dose introduces a fraction, so I will give the medicine for two days: Potassium iodide, 1 drachm; creosote, ½ drachm; rectified spirit, 2 drachms; liquid extract of liquorice, 3 drachms, or 4 drachms of the older *Pharmacopoeia* preparation (which makes a better mixture, I think). Water to 6 oz. A tablespoonful to be taken every four hours. Will children take their proportionate dose? Yes. Their taste is so blunted during the height of the disease, that by the time the patient begins to rebel it is time, or almost time, to substitute the more palatable tonic.

In this combination the antiseptic action of creosote limits the extension of the pneumonic process. It directly opposes the invaders, probably by making the circulation an unsuitable haunt for them, and perhaps also by digesting enzymes. The iodide, stimulating cell action, loosens the exudate. The fluxion is diminished by the quieting effect both drugs have upon the heart, by their combined diuretic action, and by the reduction of blood pressure by the iodide. All these actions, too, control the alveolar diapedesis.

It may be objected that people die from heart failure and poisoned vasomotor centres, and therefore we do not wish to quiet the heart or lower the pressure. But our business in general is not with dying people, but with people stricken with pneumonia. To quiet the heart and reduce its work from the first will, I contend, prevent right-sided engorgement, and the combination will prevent poisoned vasomotor centres.

It is the part of creosote to diminish the output of the toxins and also to neutralize those in circulation; but this latter result must be brought about to some extent by the valuable action of the iodide in stimulating leucocytosis.

Delafield and Prudden say:

> In general, according to our present knowledge, the leucocytosis of infectious diseases may be regarded as the effort of the blood-producing organs to protect the blood and tissues by means of leucocytes against invasion of micro-organisms and against the action of the toxins present in the circulation.

The iodide thus calls upon the body to bring out its reserves.

Just this brief consideration must suffice now, though it should be added that the dual work of these drugs should be considered the sum of the actions of each, *plus* something more, to be put to the credit of the partnership.

I want next to say why this drug treatment is superior to vaccine treatment.

A splendid account of skilful work along this line of attack was given by Willcox and Parry Morgan at the last annual meeting of this Association, and their results were extremely good. Out of 24 cases treated, only 2 ended in death, and of these one came in with marked dilatation of the heart and another died from nephritis with suppression after the pneumonic symptoms had subsided. Still, these two deaths must be noted against absence of mortality on this side, and the possibility of a much greater number being treated without mortality, which obviously follows the fact of no fatalities so far as I have gone.

There are many disadvantages connected with the vaccine treatment. The delay in preparing a vaccine from material supplied by the patient himself—quite a long delay in so acute a disease. Although it is advised that a dose of stock pneumococcus vaccine should be administered immediately, it is quite obvious that this may do no good at all, and the disease runs on for about two days before the better remedy is administered. Another disadvantage is the pain caused by the puncture of the chest wall and the risk attaching to this method. And yet another: the necessity of knowing the particular organism which has invaded the lung. Another difficulty to be dealt with is the necessity of developing in cases of infection a threefold immunization. It is, of course, possible that these disadvantages are not so serious as they appeared last year; but the advantage of avoiding them is on the side of the drugs—the despised drugs.

In commencing a brief analysis of my 20 cases, in which all recovered, and so far as I know are well to-day, I divide them into: 4 in which the disease aborted, 2 instances of pneumonia in a phthisical woman at periods divided by a few months, 1 severe case of typhoid pneumonia following influenza, and 13 other cases grouped together.

In 2 of the cases of aborted pneumonia the excellence of the treatment was proved up to the hilt, by all treatment failing to relieve distressing nervous trouble till diagnosis of pneumonia and administration of the usual mixture, when all the symptoms vanished—symptoms which would not vanish in the ordinary way before such medicine, and only departed now because the cause—pneumonia—had met its antidote. Meningitis was suspected in the one child, and the iodide had already been given for this reason before pneumonia was diagnosed, and creosote added.

In the other case I was sent for in the night because of convulsive disturbance; and here again the local signs were slow in coming, but the disease quick in departing on application of the treatment.

In the patient who shortly after influenza had so severe a pneumonia, the asthenia became so extreme that he took alcohol for twenty-four hours without a protest, though a strong teetotaler. When he demurred rather strongly to taking more, I considered my point had been gained. Strychnine injections were given to this patient; and in general he gave opportunity for applying the art as well as the science of medicine. I mention these details because I do not wish it inferred that it is never necessary to give alcohol or strychnine in conjunction with my treatment. The mere fact of patients desperately ill being saved may mean protracted recovery. Omitting the phthisical person, of the 18 other cases I cite 7 were ill for a long time.

To return to the abstainer mentioned, he has been to me since his illness with slight phthisis, and I cannot help thinking that in the case I have related, I had to do with a very mixed infection. It is possible that the case was protracted through my timidity in omitting the iodide, though I restored it to the medicine afterwards.

It is a remarkable fact that most of the worst cases in this series either had the prescription I have quoted altered and the changes rung on it or had the graduated prescription I used early in the series. I had 2 cases in which the patients took pneumonia and the medicine was prescribed; but I found that the medicine had not been given regularly. Both these patients were ill for a long time. They both had hypodermic injections of strychnine, and one had quite a long series of these. They both were very delirious.

One boy had a relapse. He ceased taking the mixture on June 1st, 1906, and had pneumonia again on July 16th. The disease quickly died down again after the medicine had been resumed. I have counted these as two cases to make my 20, because I have had to omit a case in which ammonium carbonate was added to the mixture, thus vitiating the case so far as our present purpose is concerned.

The sequelae included empyema, for which a boy went to hospital to be treated, and a large abscess pointing in gluteal region, for which a man was treated at home.

Of the 20 cases, 12 patients were children and the remainder were equally divided between the sexes. They were spread out over a long period, so that success can

hardly be said to have been dependent on the occurrence of a mild epidemic. Many of the cases, too, occurred under by no means favourable circumstances. There was but little help from the trained nurse in the whole series, and some of the patients were by no means promising subjects.

In concluding, let me lay emphasis on the importance of early diagnosis, the detection of slight dullness, slight resistance on percussion, conjoined with the systemic disturbance already engaging attention. The medicine should be given in full strength from the time of diagnosis, and may perhaps be sometimes used slightly stronger—never weaker. The aborted cases which I specially mentioned occurred late in the series, when I was bolder in applying treatment.

SECTION OF LARYNGOLOGY.

Herbert Tilley, B.S, F.R.C.S., President.

Surgeon, Ear and Throat Department, University College Hospital, London.

PRESIDENT'S INTRODUCTORY REMARKS.

After some complimentary allusions to the achievements of foreign laryngologists present, and to past Presidents of the Section, Mr. Tilley said: How different is the teaching of laryngology to-day compared with fifteen years ago! At that time, with one or two notable exceptions, the general hospitals of London entrusted instruction in the subject to the assistant surgeons or physicians of the staff, who had had no particular training in that branch of work, and they could neither afford the time nor was it to their interest to spend much time in becoming experts in the technique and manipulations which the rapidly growing speciality demanded. As a result many students were forced to attend special hospitals, or even to find their way to Continental schools, where greater facilities were afforded and men of world-wide reputation ministered to their needs.

To-day there is scarcely a general hospital in London or the large provincial cities which has not a throat department fully equipped and presided over by men who give their whole time and attention to the subject and who have earned the respect and friendship of their colleagues engaged in the more general realms of medicine and surgery. Who would have credited that in so short a space of time the membership of the Laryngological Society would have increased from 100 to 200 with an average attendance of 48 at its monthly meetings?

We cannot stop to analyse the meaning of this extraordinary progress or to recall how our leaders gradually wore down the opposition which raised its hydra-like head against this, as it does against most other young and pioneer movements, be they political, social, or scientific. I am quite sure, however, that two of the greatest factors in raising laryngology and rhinology to their present position have been the powerful influence exerted by the good work of the Laryngological Society of London and the personnel of those who compose its membership.

A brief glance over the history of our speciality during the last fifteen years will reveal that an enormous amount of excellent work has been done, and perhaps most of it in relation to the diseases of the nose and its accessory sinuses.

At the beginning of this period the maxillary antrum alone claimed the attention of the surgeon, and how very unsatisfactory was the treatment of chronic suppuration of that cavity must be well known to many of us. Then came Ziems's paper detailing his personal experience of the affection, and advocating alveolar drainage. The subject was infused with a new interest, but the failure of many cases to cure by alveolar drainage led to the initiation of those radical measures associated with the names of Caldwell, Luc, and Spicer. This method enormously shortened a form of treatment which had hitherto proved wearisome to both patient and surgeon.

In rapid succession the other nasal accessory sinuses were made to reveal their hidden recesses and the relation of these to surrounding structures. The surgeon was not slow to take advantage of the resources of the electrician and the physicist, so that, by means of transillumination and the x rays, it might truly have been said that "there is nothing hid which shall not be revealed."

It was soon obvious that the deeply situated sinuses were amenable to surgical intervention, and that chronic suppuration, hitherto more or less intractable, could now be successfully treated in the frontal, ethmoid or sphenoidal sinuses. There was no lack of enthusiasm in operating, and ingeniously contrived instruments for attacking these regions multiplied with amazing rapidity. Then, as is usual, one began to hear of fatal cases, and sometimes these were reported in the medical journals. Those busily engaged in this branch of work toiled ceaselessly to overcome the dangers incident and peculiar to this class of disease, but even to-day we cannot claim that our methods are perfect, nor that our major operations are altogether free from anxiety.

And here I think I notice a distinct tendency to greater conservatism in the treatment of the more intricate sinuses. The pendulum has swung backwards very considerably, and where a few years ago a suppurating sinus would have been an indication for immediate operation, and this in spite of the patient's general good health and the absence of pain, to-day experience has taught many of us to look more leniently on such a case when it gives rise to little more than inconvenience to the patient.

With regard to the frontal or fronto ethmoidal sinuses, how many patients have we known to die from unrelieved suppuration during the past fifteen years? Very few. On the other hand, "How many cases can we recall that have died as a result of operations even when carried out by skilled and experienced surgeons?" More than we care to remember. And when we think calmly on this subject, must we not allow that, even if some pus be swallowed, it may be destroyed by the acid gastric juice of the stomach, and, if not, that the human organism can manufacture antitoxins as cleverly, perhaps, as the pathologist in his laboratory?

In contrast with the practice of the past few years, may we not occasionally defer for a while external and possibly disfiguring operations, and see what improvement may result from the establishment of free intranasal drainage and subsequent irrigation, possibly combined with the use of an appropriate vaccine?

I wonder if such thoughts as these are a sign that one's pia mater is losing its elasticity? On the contrary, I hope they represent lessons learnt in that most exacting of schools which we call Experience.

One of the greatest improvements in nasal surgery has been the treatment of nasal obstruction due to septal deformities by the operation of submucous resection—an advance which we owe to the genius of Killian (Freiburg) and Freer (Chicago). Before the introduction of this method such obstructions were the bugbear of the nasal surgeon; to-day there is probably no operation in surgery which gives so quick and complete relief to the patient.

The subcutaneous injection of paraffin introduced by Gersuny (Vienna) for the obliteration of the deformity of a sunken nose or as a means of levelling up depressions following external operations on the frontal sinuses has not been so successful as we were led to hope in spite of the kindly aid of the photographer's art. Serious accidents were reported, and who of us has not seen oedema of the eyelids and a "wandering" of the paraffin many weeks after a "successful" injection?

I have a vivid recollection of spending two hours of a glorious summer afternoon in a mansion on the Sussex Downs dissecting out paraffin from a lady's nose and eyebrows. So hideous was the deformity that for eight months the patient had not been outside the grounds of her home; she refused to see any of her friends, and only with considerable shyness and diffidence would she allow me to examine the condition of her face before operating. Whether the injection of solid is free from the risks of melted paraffin I do not know; at any rate, I think the method is very little used in London at the present time.

The intimate relationship between inflammation of the ethmoid bone and nasal polypus has been reinvestigated, but we are still in the dark as to whether the primary inflammation is in the bone, periosteum, or mucous membrane. Lack has, however, demonstrated that recurrence of these growths may be very effectually checked by thorough removal of the diseased ethmoidal cells, and

most of us will agree that in selected cases the operation is an excellent one. And here let me add that we must not condemn the method because fatalities have occurred in the hands of the clumsy or inexperienced.

And so we might proceed from one region to the other, but we have other work before us. I should like to have dwelt on the improvements which have been instituted for attacking and successfully dealing with large growths in the naso-pharynx which formerly were looked upon as formidable operations on account of excessive haemorrhage at the time or of the risks of a later septic pneumonia—evils which have been overcome or much diminished by previously cleaning the mouth and teeth, a preliminary laryngotomy and more efficient laying bare of the tumour by a modified Rouge's operation. A more scientific and thorough method of removing submerged tonsils has recently become a more regular practice, and I am delighted that this matter is to form one of the subjects for discussion at the meeting.

In the larynx and lower air passages one recognizes three great advances:

1. The more general recognition by the profession of the significance of chronic hoarseness—whereby many lives have been saved from cancer and consumption and many voices restored by the removal of simple non-malignant growths or ulceration.
2. The recognition of the early stages of tuberculous laryngitis and its treatment by rest of the voice and possibly galvano-puncture. In this matter we must not forget the excellent pathological work done by our friend Jobson Horne.
3. The direct method of examining and treating intra-laryngeal, tracheal, bronchial, and oesophageal affections. Truly an extraordinary development in our resources, and particularly so when dealing with foreign bodies lodged in the lower air passages. How much we owe to Killian and his assistants for the perfection to which this method has been brought!

If I dared to trespass on your patience for a few moments longer it would be to forecast the future of our speciality, but that entrancing subject must scarcely be touched upon.

I can imagine that our young workers must regard the field for future efforts as a restricted and somewhat barren one when they remember that there are no more nasal sinuses awaiting discovery, and that to-day the human eye can with direct vision see all that lies between the lips and the larger bronchial tubes, or even to the pylorus of the stomach. My old teacher, Mr. Christopher Heath, used to be very fond of saying that the province of the throat specialist included all diseases between the lips and the levator ani, and I am inclined to think he would have had more just grounds for his gibe if he could see us to-day when we are able to inspect the deeper air-ways, the oesophagus, and even the very walls of the stomach.

But, gentlemen—and I speak more directly to the juniors—there are vast fields for research. Who and where are the young workers who shall solve for us some of the riddles of infection and immunity? To whom so readily as for them are the portals of infection so open and so accessible? Where better than in the nasal mucous membrane, the pharynx or the larynx are the phenomena of tuberculosis so easy of study and observation or the results of treatment so obvious, be they positive or negative? Who shall ascertain what are the innate conditions of the mucous membranes which assist in rendering the pneumococcus or streptococcus of to-day inert while to-morrow they may be capable of the direst evil in their host? Who will forge the key which shall unlock the mysteries of hay fever, asthma, paroxysmal sneezing, and a host of other maladies which render life so miserable to those afflicted by them? Will the instruments we are using to-day be of historical interest in the museum of fifteen years hence, and shall we not then be discussing the relative values of this or that vaccine or antitoxin?

Such are a few of the thoughts which jostle to the fore-front to-day as we review the progress of the past decade and wistfully regard the future. Perhaps in the strength of our manhood and experience we are inclined to feel somewhat superior to those who have gone before us, to smile at the methods of their work or at their ignorance of those things which seem so simple to us in the year of grace 1910. But it was ever thus, and I will conclude with the expression of two thoughts.

In the hour of our self-satisfaction let us remember the pregnant words of that distinguished American citizen, who in his recent Romanes lecture warned us that the knowledge of to-day may prove to be the foolishness of to-morrow. When, on the other hand, we are inclined to fancy that little more remains to be done, and that we have exhausted the resources of our special calling, it may bring us solace to remember those inspiring words of Robert Louis Stevenson, "To travel hopefully is better than to arrive, and the true success is to labour."

DISCUSSION ON DIRECT METHODS OF EXAMINING THE AIR AND FOOD PASSAGES.

OPENING PAPERS.

I.—Carl von Eicken, M.D.,

Professor of Rhino-Laryngology at Freiburg-i.-Br.

Taking for granted your general acquaintance with the methods of direct examination of the air passages and the instruments necessary thereto, I will confine myself to some special questions of the technique and then more fully discuss the difficulties and dangers which occur in practice and the means to overcome them.

The best fashion of illuminating the endoscopic tubes is a very much disputed question. I think the majority, however, have decided in favour of outer lamps, and with good reason, for all inner lamps encroach on the lumen, which is a very real disadvantage in working with tubes of small calibre. Moreover we cannot completely protect an inner lamp from becoming soiled and dimmed by the secretions, and when this has occurred then the lamp must be withdrawn and either cleaned or replaced by a new one. During all this time our field of operation is in utter darkness. There is also great danger of an inner lamp breaking off and falling into the bronchus. From all these faults outer lamps are free. Shall the lamp be fixed by a head band before the eye of the examiner or to the tube itself? Does the advantage lie with the Kirstein lamp, which moves independently of the tube, or with the hand-lamp of Brünings, which is attached to the tube?

A fixed lamp is without doubt to be preferred when we wish to demonstrate a certain finding to a large number of onlookers. Besides, such a lamp for a beginner does away with all the difficulties of illumination. But except for demonstration purpose, the Kirstein lamp renders us equally good service. For cases complicated with profuse purulent bronchial secretion I even consider the Kirstein lamp more suited, in that one can merely by slight movements of the head better protect the lamp from becoming soiled and obscured without entirely cutting off the illumination of the tube. I also prefer the Kirstein lamp for the fine manipulations required in the larynges of children. I am convinced that the reason the Kirstein lamp has not met with general favour is due to its former faulty construction, and to the indifference of the instrument makers to the shape of the head of the examiner. The connecting piece between the lamp and the head band must be of different lengths to correspond to the incline of the forehead, so that the examiner can conveniently look through the reflector and in the axis of the reflected rays without bringing the lamp too near his cheek.

The greatest difficulty for the majority of men in the endoscopy of the air passages is the finding of and passing through the larynx; especially is this true of the small larynges of children. Many authors recommend the introduction into the trachea of a tube fitted with a mandarin after the O'Dwyer intubation method; but as one by this procedure occasionally passes into the oesophagus I prefer the introduction under the control of the eye. In the epiglottis we have the most important landmark, which we readily find if we introduce the tube at first only a very little way into the mouth and exert a certain pressure on the middle of the tongue. When the oral surface of the epiglottis comes into view it is quite easy to pass over its free border with the beak of our tube spatula; here the mistake is frequently made, in an effort to reach the vocal cords, of pushing the tube too far downwards, a movement by which the oesophagus is invariably entered. We must bring ourselves, therefore, to press the tube at first further forwards until we have seen from above and in rotation

the aryepiglottic folds, the arytenoids, the posterior part of the vocal cords, and finally the whole glottis. The passage of the glottis may be attained in one of two ways: either introduce the beak of the tube into the posterior commissure of the widely opened larynx and by forcibly raising it separate the vocal cords so widely apart that the trachea now lies free before us; or by keeping the beak of the tube in the sagittal plane introduce it into the closed glottis at the same time sinking and rotating the tube in an angle of 90°. This latter manœuvre commends itself most especially for small children, who, even under deep narcosis, have the unusual power of absolutely closing the entrance to the larynx with sphincter-like tension.

When the larynx is passed, usually the further introduction of the tube offers no special difficulties. The only other thing that is here necessary is to keep the lumen of the trachea or bronchi always visible at the end of our tube.

If the head of the patient is properly held the whole trachea as a rule can be examined when the tube has passed the glottis. In the bronchi we must exert a moderate pressure, with the tube on the lateral circumference of the bronchi, in order that the axes of the bronchus and tube coincide. One must, above all, avoid scraping the end of the tube along the median bronchial wall.

The significance of the endoscopic picture which we meet with on the way from the larynx to the ramifications of the bronchi always presupposes an exact knowledge of the anatomy of these parts. We have to look upon the several bifurcations as the most important landmarks. It is well known that the bifurcation of the trachea does not lie absolutely in the middle line of the body. Frequently it deviates to the left, so that in looking from above it is hidden from view. The direction and calibre of the right main bronchus do not essentially differ from those of the trachea. Hence it is that many examiners, after having sought and failed to find the entrance to the left bronchus, pass directly into the depths of the right main bronchus. To guard against this mistake we have only to observe closely the left tracheal wall, which in its lowest part shows the strong transmitted pulsations of the aorta. If we now cautiously press the tube against this wall and follow the outlines of the tracheal rings, we will soon come to a point where these rings apparently cease. Now we are at the entrance to the left bronchus and the bifurcation presents itself to view.

Much easier to miss are the openings of the bronchi to both upper lobes. Here also it is the rule to give a lateral direction to our tube to find these structures. We need only introduce our tube 1 cm. to 1½ cm. at most, when almost on the same level as the bifurcation of the trachea we come upon the somewhat rounded rectangular bifurcation of the entrance to the right upper lobe. On the left side the main bronchus divides first at a much greater depth into its two principal branches, which latter soon again break up into their roots. To see the entrance to the bronchus of the upper lobe on this side we must direct the tube forwards and outwards, after first noting the bifurcation to the lower lobe, into which the tube naturally first enters.

In what position shall we place our patient? For an examination of short duration I generally prefer the sitting position, if salivation is not too profuse. For all other cases the lateral or dorsal position is more comfortable for patient and examiner. With the exception of very small children, who can be held vertically by a nurse or assistant, only one of these positions comes into question in general narcosis. It easily happens, especially with children, in the dorsal position with the overhanging extended head, that the cervical part of the spine is too much flexed—a condition which must be avoided. The patient who is not anaesthetized considers it very repugnant that the secretions gather in the naso-pharynx, and later run out through the nostrils over the eyes. At the termination of the examination a basin must be at hand into which the now erect sitting patient can expectorate and blow out the collected secretions, often quite a considerable quantity. After the examination it is well to put anaesthetized patients in the lateral position. The carrying out of the whole examination in the lateral position—quite possible also on anaesthetized patients—has the great advantage that the secretions which collect in the buccal cavity can always run out over the lower angle of the mouth.

To successfully combat the enormous secretion, which, in those cases with extensive bronchiectatic cavities, can render the examination quite unusually difficult, two means are at our disposal. First, for half an hour to one hour before the direct examination we have the patient assume the lateral position on an incline in such a way that the hips are highest, and the healthy lung lies below the affected one. In this way a spontaneous outpouring from the cavities occurs, and one is at times astonished at the great quantity of sputum which is coughed up in a short time. Secondly, when the bronchiectatic system has been as far as possible emptied, then we examine the patient in the sitting position because in this the flowing out of secretion from the cavernous cavities is either completely stopped, or at least rendered very difficult.

I now pass to the second and more important part of my paper—namely, the difficulties and dangers that arise in practice. We divide these into those due to (1) anatomical, (2) psychical, and (3) pathological conditions. Under anatomical conditions we have first to consider the influence of the age of the patient. The smaller the individual the smaller must the tubes be. While, on the one hand, this entails a smaller field of view and more difficult orientation, still, on the other hand, the root of the tongue, with its epiglottis, owing to their soft nature, can be easily pressed forwards without the use of practically any force.

When we have learnt to explore the small larynges of children, the location of the anterior commissure, the passage of the glottis, as well as the inspection of the lower air passages, offer no special difficulties. To protect the small patient from injury we must be careful not to use too large a tube, as, when the small glottis has been subjected to too great pressure, or has been injured by the introduction or withdrawal of the tube, there very readily develops, after the tube's removal, an acute laryngeal stenosis, which may necessitate a tracheotomy. The view advanced by some authors that a child's larynx will tolerate a certain dilatation seems to me, therefore, very questionable.

With adults a very well developed and complete set of teeth in the superior maxilla, as well as a short neck and a high grade of muscular rigidity, offer special obstacles to the direct examination. In such cases we must press the tube well over into the angle of the mouth, and even then it is still often necessary to exert a quite strong pressure on the epiglottis and root of the tongue, in order to see the larynx. The location of the anterior commissure can sometimes be so difficult that Brünings has invented a special instrument, which he calls "counter pressure autoscope," for the inspection of this part of the larynx. When the tip of the tube spatula has approached the anterior part of the vocal cords, as is possible without too much pressure on the root of the tongue and epiglottis, then the larynx, which is drawn somewhat away from the vertebral column, is subjected to a counter pressure from in front through a plate connected by a steel ratchet-toothed arm to Brünings's hand lamp. Through the combination of pressure from within and without the exposure of the most anterior part of the glottis is successfully obtained. Killian has quite recently perfected an exceptionally simple instrument, which possesses the same advantage. It is the so-called angle-spatula, which, as you can understand, must exert much lighter pressure on the soft parts of the tongue than either the Kirstein or tube spatula. Should the anterior commissure not be located with this instrument alone, then a slight pressure with the finger on the anterior surface of the larynx suffices to effect the desired result. The soft pressure of the finger is more agreeable to the patient than the pressure of a rigid steel plate.

More important still than the question of the exposure of the anterior commissure is the question of the possibility of direct tracheo-bronchoscopy under such difficult conditions as just mentioned.

If we wish to inspect the right bronchus, we introduce the tube from the left angle of the mouth, and if the left bronchus from the right angle of the mouth. In rare cases, where besides large teeth there are also present a short neck and muscular rigidity, it is impossible to move the

tube, when once it is in the trachea, across the upper incisor teeth from one angle of the mouth to the other.

For the success of the examination, the psychical condition of the patient is of great importance. The majority of adults have sufficient intelligence and will power to put up with the unpleasantness of the cocainization and direct examination. Bright and well-trained children behave equally well, when once we have won their confidence and shown them that the examination will not cause any great trouble or pain. The examination of a patient by force I consider absolutely wrong. It is well to have some prearranged signal with the patient, such as raising the right hand, by means of which he can notify us to remove the tube, which we must implicitly follow. Anxious patients are inclined to give this signal before they have felt any pain whatsoever, but by words of encouragement we can generally win their confidence, so that in one or two trials they succeed in following the wishes of the doctor. The co-operation of the patient, such as the restraining of a fit of coughing at a very critical moment, is of incalculable aid for successful work, particularly in very difficult cases. If we cannot count on such qualities in our patient, and if we have not the necessary time at our disposal to prepare him by repeated exercise, then in the case of adults a hypodermic injection of morphine, or in extreme cases general narcosis for either adults or children, will remove all psychical difficulties.

Authors differ from one another in the anaesthetic used. Personally I always prefer chloroform to ether. Before the narcosis we can with adults employ without greater danger remedies to lessen reflex irritability or profuse secretion, such as bromide preparations, codeine, morphine, or atropine.

Even with general narcosis one must not omit local anaesthesia with cocaine 10 to 20 per cent. solution, to which some preparation of suprarenal may with advantage be added. If, for example, we have to deal with the extraction of a foreign body from a bronchus, we must cocainize the glottis, the bifurcation of the trachea, and also the immediate neighbourhood of the foreign body—a region which usually shows a high degree of reflex irritability. The cocainization of this last-mentioned area is best carried out by means of Brünings's bronchial spray apparatus. Here let me strongly warn you against the danger of the cumulative action of various poisons in children, particularly young children. Morphine and atropine are to be entirely avoided, cocaine to be used as sparingly as possible, or, better, to be replaced by such new local anaesthetics as alypin, novocain, etc. According to general experience, an oft-repeated deep chloroform narcosis for a short time is not nearly so dangerous in children as the too free use of cocaine or the simultaneous employment of several toxic drugs.

Before the use of the direct method it is above all of the greatest importance to have as thorough a knowledge as possible of the general state of the patient and the local pathological conditions. An exact anamnesis, which often gives us very essential points, is to be followed by an examination of the inner organs by all the modern means at our disposal, especially the Roentgen rays, particular attention being paid to the condition of the heart, vessels, kidneys, lungs, and their secretion.

Advanced cachexia, marked arterio-sclerosis—especially in combination with sclerosis of the coronary arteries—definite signs of an aortic aneurysm, severe valvular or myocardial disease, contraindicate the use of the direct method of examination, except for some very special reason. Where, for example, we have definite signs of an aneurysm of the arch of the aorta I consider it absolutely unallowable to use the direct method in order to obtain an exact knowledge of the local situation of the prominent part of the aneurysm in its relation to the tracheal or bronchial wall. The examination of the larynx, trachea, as well as the beginning of the bronchi with the laryngeal mirror should be much more regularly practised than is often the case to-day. The more frequently and more carefully we perform this method, the more often we will be able to dispense with the direct method, more especially when mere diagnosis is our object. Local therapeutic measures—as the removal of tumours and foreign bodies—can in the deeper parts only be carried out by the direct method. The direct is likewise the only possible method for the inspection of the lower air passages, as also for diagnostic purposes in children.

Pieniazek and Körner have called attention to the fact that the examination of children with tubes can, under certain conditions, have fatal consequences. Pieniazek lost a child whilst doing direct upper tracheoscopy, and a case of Körner's died of asphyxia before the direct examination had even begun, the head of the anaesthetized child only having been stretched on the table. Pieniazek found by the *post-mortem* examination that the cause of this regrettable occurrence was an extensive cold abscess of the three lower cervical and the first thoracic vertebrae over which the trachea and beginning of the bronchi were actually stretched, and at the same time compressed from behind. Similar pressure conditions may also have been present in Körner's case, on which, however a *post-mortem* examination was not performed. The trachea is generally able to move from one side to the other when pressure is exerted on one side alone, but should a large tumour or abscess press directly from behind on the trachea, especially at the level of the thoracic entrance, then the trachea will be crowded up against the manubrium sterni and unable to move towards either side. Is there any way possible of guarding against such occurrences? I think there is. For, first, the *x*-ray picture can reveal with certainty such large abscesses, and, secondly, by simply bending the patient's head backwards we can exactly observe whether or not the dyspnoea increases.

Under what conditions is tracheotomy to precede the direct examination? According to my mind, severe and dangerous dyspnoea, more especially when it has already existed for some time and the patient is exhausted, is an absolute indication for tracheotomy. And it is quite indifferent whether this dyspnoea be due to a narrowing of the lumen by pressure from without or by the pressure of a foreign body or tumour in the larynx, trachea, or bronchi. Artificial respiration, the use of pure oxygen gas, and in cases of threatening heart failure hypodermic injections of camphor or caffeine, may exceptionally help us to tide over a critical moment. If the stenosis disappears after the tracheotomy, the obstruction to respiration is, as a rule, situated above the wound, in which case the direct, or even the retrograde, laryngo-tracheoscopy is indicated. Where, on the other hand, no improvement occurs, then we must direct the tube into the lower air passages.

Certain other indications are to be added to those general ones when we especially consider foreign bodies. Unusually large ones with sharp prominences or hooks—for example, a dental plate—will be best removed from the bronchus through a tracheotomy wound, because otherwise there is the danger that such a foreign body may become stuck in the subglottic space or larynx, or, at all events, cause severe injuries of these parts, demanding either an emergency or perhaps secondary tracheotomy. Before every extraction of a foreign body we must ask ourselves if its presence has not resulted in the temporary or permanent loss of function of the lung of one side, and if there is not the danger of complete cessation of respiration during its passage through the trachea and larynx, or of it slipping from the extracting instrument and being sucked into the bronchus of the only functioning side. In a further category of foreign bodies—namely, soft beans—I would especially advise tracheotomy. It is well known that beans, the aspiration of which is confined almost exclusively to children, become not only softened, but also swollen after a few hours in the air passages. There is the danger, therefore, that in the attempt at extraction with upper bronchoscopy the foreign body either crumbles—in which case we have not only one but a whole series of foreign bodies to remove—sticks in the subglottic space, or finally is either whole or in parts sucked into the bronchus of the up to now free lung. Though in a few cases it has been possible to remove the bean through the natural ways, still even here the majority required a secondary tracheotomy, owing to glottic oedema.

Finally, all foreign bodies which we have failed to remove by upper bronchoscopy are to be treated through a tracheotomy wound. Owing to the great improvement of our instrumentarium and our increased practice, the number of such cases has become relatively smaller. I

would only like to point out that the removal of a piece of bone embedded in easily bleeding granulation tissue, which formerly formed a difficult technical problem in bronchoscopy and therefore often necessitated tracheotomy, may to-day, thanks to the delicate tooth-forceps of Brünings, be easily and successfully accomplished in the first attempt with upper bronchoscopy. We need only seize it by a point or edge protruding from the granulation tissue, and its extraction is certain; the bleeding from the granulations, which in former days caused such unspeakable difficulties, occurs now only after the foreign body has been removed, and consequently does not interfere with the actual operative procedure. For the finding and extraction of needles we use special instruments, with some of which it is possible to break *in situ* a needle that is sticking crosswise in the lumen of a bronchus. Collar studs, which usually lie in the bronchus with their head downwards and base upwards, can be much better removed to-day through the natural way by the Morton and Brünings forceps constructed specially for these foreign bodies. For hollow bodies there are a whole series of valuable instruments at our disposal, which, by expanding, grip the hollow body from within.

In spite of all these new aids in technique there will always still remain a number of foreign bodies which can be successfully dealt with only by lower bronchoscopy.

Just a few words about the treatment of foreign bodies impacted in and behind a stricture. The dilating instrument may be introduced right up to, or alongside of, the foreign body, or having pushed the foreign body further down may act directly in the stricture itself. The two first methods are only seldom attended with success; the third, on the contrary, usually succeeds because the bronchus is as a rule dilated behind the foreign body. But after the displacement of the foreign body and the greatest possible stretching of the stricture, the extraction may still be impossible because immediately after the withdrawal of the bougie the cicatrized bronchial wall contracts again. The removal must therefore be effected immediately after the use of the bougie, or better still simultaneously with it. Brünings has made this possible by the construction of his handless seizing instrument and concentric hollow metal bougie. The well-known case of Killian and Brünings, in which bronchoscopic technique achieved one of its greatest triumphs, was treated by these means. Here they had to deal with a tack having a large, flat head, with a sharp border that was firmly lodged in a stenosed right bronchus. After repeated dilatations its removal was accomplished without any injury to the surrounding parts by a specially-constructed tube, the end of which could spread open and then completely covered the head of the tack. This case is of further interest for the reason that after the extraction a systematic dilatation of the bronchial stricture was successfully carried out.

II.—D. R. Paterson, M.D., M.R.C.P.,

Surgeon to the Ear and Throat Department, Cardiff Infirmary.

It is not without interest to recall that the examination of the food passage was almost a worn and threadbare subject before the feasibility of the exploration of the respiratory tract was even thought of, but without the extraordinary advance in the science of bronchoscopy which we owe to the Freiburg school the technique of oesophageal work would not be the safe and simple procedure it is to-day. At first sight, on finding that practically the same instruments take part in the technique of both examinations, it might be supposed that the procedure was also identical, and, indeed, to an onlooker, the difference may not be very obvious. But a little reflection will show that the problem must necessarily vary to an important degree in the two passages. On the one hand, in the trachea and bronchi, we have a semirigid tract; in the gullet a soft muscular canal. In the latter we have to overcome the sphincter-like action of its mouth, a procedure which is often disconcerting. In the larynx the rigid vestibule acts as a guide into the trachea; the hypopharynx, on the other hand, is lax and unhappily permits the point of a tube to wander. After passing through the cricoid orifice the cervical part of the gullet is still a closed passage in its upper section, only expanding in its lower to a wide cavity in the thoracic region, and finally there is a second, though less troublesome, constriction to be negotiated at the lower end. It goes without saying that this contrast in physical structure in the two passages counts for something in their operative technique.

It may be laid down as a good rule that a careful examination should be made of the bodily organs generally before proceeding with a direct examination of the oesophagus. I am afraid this has not been carried out as regularly as it ought to be, since control by inspection has happily rendered the passing of the tube such a safe procedure; but it is nevertheless desirable, especially where there is any suspicion of aneurysm. In this case also, and where there is a question of a foreign body, an *x* ray plate should be obtained. The indirect examination of the hypopharynx with the aid of the laryngeal lever, which we owe to Professor von Eicken, is especially valuable, affording, as it does, a survey of a region which is so frequently the seat of the disease.

In the matter of better lighting there has been a very definite advance, and the improvement in the electric lamp has coincided with real progress in this department of endoscopy. Here, however, I would put in a plea against abandoning means of illumination which are often available and are still, in many ways, quite satisfactory for our purpose. It ought not to be forgotten that the ordinary incandescent burner will give a good view through an 11 or 13 mm. tube—quite sufficient, for instance, to enable the relations of a foreign body to be made out. This is useful to bear in mind when we place ourselves at the mercy of electric light vagaries.

Of the forms of electric illumination I have very little experience of the distal lamp, in which the light is carried at the extremity of the tube. It has, of course, obvious disadvantages, and the contention that the proximal lamp is just as liable to get smudged by secretions is more true of the air passages than the gullet. But the advantage of a steady light close to the field of observation is very great, and many workers who can show brilliant results have done so by the use of it. I need not go into the merits of internal and external lamps, but I hope the discussion may serve to define the conditions in which distal illumination is serviceable.

Most of us in this country employ the outer lamp fixed on the forehead, as in the Kirstein, or attached to the tube, as in the Brünings electroscope. Each system has its peculiar merits, and speaking generally the two forms may be said to supplement each other. I make use of both to a considerable extent, and would not willingly be without either. For examination of the hypopharynx and the mouth of the gullet the lamp attached to the tube is admirably adapted. It is convenient, can be readily applied, thus saving time, and gives an excellent fixed light which illuminates brilliantly the longer tubes. Its disadvantage—and this is a real one, it seems to me—shows itself during operative manipulation. Here it is distinctly in the way, and the introduction and withdrawal of instruments can only take place with the light switched aside, a procedure which deprives us at the time of ocular control. Certain modifications have been suggested, but none that I have seen overcomes satisfactorily the drawback. For this reason I still largely use the Kirstein lamp. It takes perhaps a little more time to get into the way of managing it, and requires more practice to get the best result from it, but it allows more freedom in operating, a matter of no small moment when working in a restricted field. From personal experience I would recommend the observer to make himself conversant with the use of both forms of illumination, and he will find it easier to circumvent difficulties which may be very disconcerting.

In the inspection of the food passage we have a choice of two methods of introducing the tube—either by sense of touch guided by a pilot or under the control of the eye. Much valuable work had already been done by von Mikulicz and von Hacker before the ocular method became practicable. Indeed, I believe it was the fortune of Kirstein in his early attempts at inspection of the hypopharynx and oesophagus to accidentally pass a tube for the first time through the larynx, though we owe it to the genius of Killian that we are to-day discussing the technique of bronchoscopy. Killian's short tube spatula revolutionized the clinical examination of the gullet. Its beaked end made its passage through the introitus more easy, and we acquired a more exact method, controlled by the eye instead of by the sense of touch. It is unnecessary

to enlarge upon this important advance, for although the mandarin or pilot has still its place, experience has shown that its use must be restricted within definite limits.

I take it that it may be laid down as an axiom that at least all preliminary examination of the oesophagus should be carried out under the control of sight. Only in this way can the observer avoid the pitfalls which beset him. It is applicable to all cases and is the only one permissible where the lesion is high up, at or immediately below the mouth of the gullet. In the latter case the passage of the tube by means of a pilot is not unattended with considerable risk, and it is on record that even in the hands of an experienced observer like von Mikulicz, it led on two occasions to perforation.

It was the custom of many of the older observers to endeavour to locate the seat of lesion by the preliminary passage of a bougie. Fortunately the introduction of the ocular method has rendered this superfluous, and it would hardly deserve mention here did not Guisez and Philip at the recent French Congress insist that oesophagoscopy should always be preceded by the passage of a flexible sound. Undoubtedly at times this yields useful information, but it entails subjecting the patient twice to a procedure which, to say the least, is not an agreeable one. This is an aspect which has to be borne in mind if we are to extend the practice of oesophagoscopy, and it ought to be the aim of all workers in this field to obtain from a single passage of the tube all the data possible. It should not be lost sight of that the examination of the gullet always involves some degree of forcible dilatation, which is not without discomfort to the patient.

The use of some form of anaesthesia is, of course, absolutely necessary. Cocaine, applied locally, usually answers the purpose, and I find a solution of 10 per cent. quite sufficient as a rule. The application is best done by means of a cotton-wool carrier, and should be made to all the parts of the pharynx with which the tube is likely to come into contact, special attention being paid to the epiglottis and mouth of the gullet. Spraying I have found unsatisfactory, and submucous injection I have no experience of. For children and nervous apprehensive people, and where the procedure is likely to be painful, a general anaesthetic cannot be done without. Sometimes morphine is very helpful, but, in general, chloroform is necessary. Many of the patients who suffer from gullet trouble are already feeble from long-standing disease, and where a general anaesthetic is called for, I have had ether administered by the open method, and have found it satisfactory. The increased secretion of mucus which it sets up and which is so disturbing in the air passages, causes little inconvenience here. It is a good plan to combine local with general anaesthesia, as the latter need not be pushed so deeply.

For an ordinary examination all will agree that it is most convenient to have the patient in a sitting position. But this can be used only for a short séance, say of five to ten minutes, since the mucus excited by the presence of the tube collects and obscures the field or overflows into the larynx and produces cough. This may be overcome by resorting to the back or side position, and it is largely a matter of individual experience which is chosen. In general anaesthesia, I take it the back will always be adopted. With a local anaesthetic patients prefer, on the whole, the left side as being more comfortable. To some extent the selection will depend on the condition of the teeth of the upper jaw. If these are good, the back position with the shoulders close to the end of the table is preferable, as the head can be moved backward freely. Whatever position the patient assumes, the operator should see that he himself takes up an easy attitude. This can be arranged by the patient's stool being conveniently low, and the table of such a height as to permit of a comfortable seat for the operator.

The help of a trained assistant counts for much. He is able by appropriate manipulation of the patient's head to facilitate the introduction of the tube and to assist its passage downwards. The patient should be instructed to leave the head perfectly free, so that all movements may be made by the assistant. The patient can assist materially by breathing regularly and not holding himself stiffly, and this should be explained beforehand so as to enlist his co-operation.

By whichever method the tube is introduced, the problem is the same—to pass it through the crescentic orifice, and to convert the curved food passage into a straight one. A cardinal rule is to keep strictly to the middle line. With the ocular method, by making use of the forefinger of the left hand to hook forward the tongue and taking the interarytenoid region as a guide, the tube is slipped over it. If it be now tilted forward, the hypopharynx is opened up, and a view of the contracted gullet mouth is obtained. A little firm pressure with the point of the tube usually suffices to overcome the reflex contraction and to allow the tube to pass. Where the lip of the introitus projects and the point impinges on it, moving the head often manipulates it through. It may be necessary to hold it in position for a short times or to rotate it, before the mouth relaxes. Sometimes getting the patient to make a swallowing movement induces the desired relaxation.

Where the lesion is known to be some distance below the cricoid orifice, introducing the tube by pilot is a safe and convenient method, especially for long tubes and those of large size. Practically the same rules guide us as in the ocular method. The bougie glides along the posterior pharyngeal wall, keeping the middle line, into the hypopharynx and oesophagus. When the tube has passed the gullet mouth the pilot is withdrawn, and the further examination takes place under the eye.

Once past the cricoid cartilage the tube travels easily through the closed upper cervical part, meeting with no resistance, and reaches the open lower cervical part, when we are able to see a considerable way down the gullet. The aortic narrowing with its prominent pulsation may be made out, and immediately below it the bronchial constriction formed by the pressure of the left bronchus on the anterior wall. These are not of much interest, and do not compare in practical importance with the diaphragmatic constriction, which, like the cricoid orifice, is guarded by muscular mechanism. The oblique course of the gullet downwards and to the left should be borne in mind, so that the proper inclination be given to the tube as it reaches the deeper part. This is most readily done by carrying the upper end of the tube in the angle of the mouth on the right side—a manœuvre which gives to the point an oblique direction to the left. For the examination of the lower part the inner telescopic tube saves the discomfort of having to introduce a longer one. Care has to be exercised in pushing it down. If it appears to stick, this is often due to faulty direction, which can be circumvented by suitably varying the body position. It is not infrequently a matter of no small difficulty to pass it through the hiatus, and several attempts may have to be made before success is attained.

The withdrawal of the tube often furnishes useful information. This should be done slowly, the mucous membrane as it is left exposed by the receding instrument being carefully scanned and its condition again noted. This serves to control the inspection made during introduction, and the parts about the mouth of the oesophagus may be seen more leisurely. In leaving the problem of the introduction of the tube, it may be well again to emphasize the exercise of due circumspection and care. Where ulceration exists about the entrance of the gullet—a condition commonly calling for examination—undue force may be attended with disastrous results, and a recent case warns us that even with the ocular method perforation may take place.

With regard to our choice of a tube, the question of size comes into consideration. The usual sizes—9, 11, and 13 mm.—are sufficient for ordinary inspection purposes, but there are circumstances in which larger tubes are desirable, and, indeed, indispensable. The cricoid narrowing is usually taken as the measure of dimension, and a tube which passes it will travel down easily. According to Starck, this orifice is 23 mm. in the transverse direction and 17 in the antero-posterior. This gives a margin in which the size of the tubes may be increased, and I have passed them up to 18 and 20 mm. Of course, the larger tube means greater dilatation, and can be used only under a general anaesthetic. It can be readily introduced by the mandarin or pilot. In dealing with an impacted foreign body the advantage of a large tube is obvious. From Burger's statistics we know that 90 per cent. of foreign bodies stick in the upper half of the gullet and 60 per cent. above the sternal notch. The majority are found

just below the entrance, as if they had just managed to squeeze through, but not infrequently they are impacted a little lower down between that and the sternal notch. If a preliminary examination has been made by a smaller tube and extraction presents difficulty, a larger tube with the patient under an anaesthetic will give more room for inspection and operative measures.

It has been the custom of recent years in this country to work very largely with the oblique-ended or beaked tube. It is more easily introduced, but for work in the gullet it has to my mind some drawbacks which are worthy of consideration. In the larger sizes the beak is quite 1 in. long, and in its passage down the point travels in advance of our field of view. I do not agree that pathological changes are always seen before the point of the tube reaches them. On the other hand, the old straight-ended tube exposes the interior simultaneously, and is in no part in advance of what it is designed to show, and gives all the advantages of ocular inspection. It may be a little more difficult to introduce, but the relations of the foreign body are better made out, and I am sure in attempting extraction it offers a decided advantage. The oblique-ended tube may, of course, be made straight ended by pushing down the inner tube, but this contracts the field of view and of work, and is a sensible disadvantage.

The telescopic tube is admirably constructed for work in the air passages which taper towards the deeper part; but in the gullet, once past its entrance, we have a canal of practically equal width throughout in which large foreign bodies become impacted, and where as much room as possible is required for extraction. For operative work, therefore, I prefer a large size, straight-ended tube, and any one who compares the view seen through it and through the beaked tube as they are pushed down will appreciate the difference. I am inclined to think that some of the difficulties in extraction of which we hear about would not occur with a straight-ended tube. The principle of the telescopic instrument is so eminently practical, that if it were adapted to have the inner tube beaked and the outer straight we would have the ideal for the oesophagus. It would combine the advantage of the narrow pilot with the accuracy and safety of ocular control. I show you an instrument which carries out this principle.

For the removal of excessive secretion Killian's saliva pump answers the purpose admirably. Its action is greatly assisted by the horizontal position of the patient. Passing the metal nozzle should be done carefully by sight where an ulcerated surface is suspected, as bleeding, which blurs the field, should be avoided.

Of the accessory instruments, a good forceps is the most important. In the gullet, a soft muscular distensible tub in contrast to the more or less rigid respiratory tract, we, require an instrument to combine lightness with strengthe and to be easily handled. It seems to me most of the, forceps in use, admirably conceived as they are for the trachea and bronchi, do not possess sufficient power, and are not always well adapted for the removal of a foreign body like an impacted denture. An ideal instrument ought to give more control over such a body without losing any of the delicacy in the manipulation. For years I have worked with the crocodile pattern forceps, which I have had made in various lengths. It is light, of sufficient strength, and having a familiar form of handle it is well under the operator's control. Moreover, it can be quickly introduced and withdrawn. Though not available for deep-seated work, fortunately 90 per cent. of all foreign bodies are within its grasp. It is a convenient cotton-wool carrier, and does good service in mopping the field of operation.

I need hardly say much about special difficulties of technique. In some individuals passage of the tube over the cricoid induces disturbance of respiration. Using a smaller size may forestall this. If it fails, it is advisable to defer the examination to another occasion, when success may crown the effort. Rigidity of the cervical spine is a troublesome obstacle in old people; but by approaching from the angle of the mouth the passage is rendered easier.

To sum up, the best guides in the technique are the trained eye and the practised hand of the observer. These can be acquired only by experience, and when we make the direct examination of the food passage part of our regular routine, it will take its proper place as a safe and valuable procedure.

III.—WILLIAM HILL, B.Sc., M.D.Lond.,

Surgeon for Diseases of the Ear, Nose, and Throat, St. Mary's Hospital, London.

SINCE Kussmaul first made a direct examination of the gullet, elongated tubes or cylinders of the same calibre throughout their entire length have been almost universally employed for endoscopy of the oesophagus, trachea, and bronchi; and when extension tubes have in addition been used, they also have been constructed on the cylindrical principle.

I have found, however, that, as far as the larynx and gullet is concerned, elongated funnels possess marked advantages over tubes of uniform calibre. At the present day endoscopes attached to Brünings's hand lamp are usually employed, but, owing to the fact that the hand lamp is attached centrically to the shank of the endoscope, there is no room for the passage of swabs and instruments by the side of the lamp down the endoscopic tube without displacing the hood and thus shutting off the light; moreover, the proximal end of the tubular endoscope being of the same narrow calibre as the distal end, the handle of the forceps or other instrument lies in the centre of the line of vision, and much obstructs the view in the narrow tube. This equally applies to Brünings's new pattern hand lamp, in which there is a slot in the mirror to facilitate the passage of instruments, but in which the view is still considerably interfered with.

With a funnel-like endoscope the lumen of the proximal end of the instrument has a sectional area more than double that of the distal end, and by an eccentric attachment of the hand lamp there is ample space for the passage of the instruments, sponge-holders, etc., *by the side* of the hood of the hand lamp without cutting off the light. It is also obvious that as forceps, etc., can be passed down close to one side of the funnel the inserted instruments, except at their distal ends, are not in the centre of vision, and a clearer view is therefore obtainable of the working of the distal ends of the instruments. Although the distal extremities of endoscopes are necessarily limited in size according to the dimensions of the area examined, be it gullet, trachea, or bronchus, there is no anatomical bar to the proximal end of endoscopes being considerably larger, sufficiently large in fact to permit of the hand lamp being attached eccentrically, and of instruments being passed by the side of the hood without disturbing the illuminating apparatus. The immense gain in simplifying technique can only be fully appreciated after actually employing a funnel-like endoscope.

I first made use of this principle of the endoscopic funnel when I designed a new pattern operating laryngoscope, which I showed before this Section at the Belfast Meeting last year. That instrument was not a complete funnel, but had a lateral slot to give additional facility in the manipulation of large forceps, etc. Following on this I later designed elongated funnels on the same principle for employment in the gullet. These were at first complete funnels; but in order to facilitate the removal of the oesophagoscope after placing a radium apparatus (with an elongated stem) within malignant strictures, I resorted to the principle of the lateral slot, as in my laryngoscope. This pattern endoscope also greatly facilitates many other endo-oesophageal procedures, such as the dilating of strictures by graduated bougieing, the removal of portions of new growths, and most especially the extraction of foreign bodies. For example, instead of needing a special apparatus for the closing of an open safety pin in the gullet before attempting extraction, with one of my slot oesophagoscopes it is quite easy to draw the pin point of the safety pin within the lumen of the endoscope with forceps, where it cannot catch the mucosa; the jaws of the forceps are then transferred to the other limb of the safety pin, traction on which tends to partially shut it, and it can then be drawn up through the endoscope with ease and safety. The advantage of being able to draw the sharp point or jagged edge of a foreign body within the protecting groove of the slotted endoscope will be obvious to all.

The distal end of my endoscope is bevelled; the great advantage of being able to pass the instrument throughout its whole course under vision, as in Brünings's

tube spatulae, will be generally admitted, more especially by those who had previously used tubes of Killian's type, where a mandarin or guide was usually necessary in traversing the deep pharynx and cervical oesophagus. These are the dangerous areas where perforations are occasionally made, but with a bevelled-ended instrument passed under vision this calamity should not happen, more especially if the patient be directed to swallow when passing the post-cricoidal narrowing and directed to cough in order to open the lumen when the mouth of the oesophagus is reached, and whilst traversing its collapsed cervical portion. If difficulty is experienced in passing the instrument on account of stricture, from whatever cause, in the post-cricoidal pharynx and upper oesophagus the instrument should not be passed onward until the lumen has been dilated up by graduated bougieing.

The passage of the oesophagoscope has been described as an easy procedure, but it must never be forgotten that it is equally easy to perforate the gullet, and in some instances it is probable that neglect of cautious instrumentation in the region of the mouth of the oesophagus has led to those regrettable incidents which have a tendency to bring oesophagoscopy into disrepute. I have heard of six cases of oesophagoscopic perforation of the gullet in this country alone in recent years, with three deaths, so that a word of caution is not out of place.

It will be seen that the cross-section of my oesophagoscope is distinctly elliptical at the proximal end and nearly circular at the distal end, and the reason for this and for the long diameter being transverse is sufficiently obvious.

I consider extension tubes a needless complication in oesophagoscopic technique; moreover, they are liable to break at the spring and to clog in the groove after frequent hospital use and sterilization. Brünings's two smallest bronchial spatulae with extension apparatus are certainly useful in dealing with the lower air passages of infants and small children, but for older patients I prefer the slot funnels.

Most endoscopes are made of brass, copper, or German silver, and are liable to dent if dropped; I have therefore had my endoscopes made up in steel. The following table gives the approximate dimensions of the complete endoscopic funnels, which, it will be seen, are made in three lengths:

Length.	40 cm.	35 cm.	30 cm.
Proximal diameters... ...	24 × 16 mm.	20 × 16 mm.	20 × 16 mm.
Distal diameters	13 × 11 mm.	11 × 10 mm.	9.5 × 8.5 mm.

The slot funnels correspond in size with the complete funnels of 35 and 30 cm. in length. It is advisable to have two of each with a right-handed and left-handed slot respectively, that is, four in all. These new pattern oesophagoscopes have now been in almost daily use at St. Mary's Hospital for nearly a year, and those of my colleagues who have employed them are unanimous in testifying that they greatly simplify endoscopic surgical procedures in the gullet.

There are other points of oesophagoscopic technique I should have liked to have alluded to, but I hesitate to take up your time any longer.

DISCUSSION.

Dr. StClair Thomson (London) said the opening address of Professor von Eicken was noteworthy from the fact that he was philosophic enough to discuss the occasions when the direct method could be dispensed with. It was rare for the propagandist to know of any time or occasion when his method was not universally applicable. He would like to know whether Professor von Eicken used in his clinic for such procedures as removal of a neoplasm from a vocal cord, or the application to the larynx of the galvano-cautery, the old, indirect method. The speaker had lately maintained in the Royal Society of Medicine that the indirect method should first be used in all cases, and that it was the simplest, speediest, and most pleasant for the patients in the hands of all who had acquired the average dexterity. The direct method was only to be called in as a secondary help. Even the direct method in cases which might have been thought the most pressing, was not always successful. He referred particularly to lesions in the anterior commissure. One case in which the beak of the Killian tube prevented access to a minute growth in this region was easily and successfully operated on by the indirect method with the help of Horsfall's epiglottis lifter. He wished to get further information in regard to electric globes, the use of accumulators compared with a street current, and the most suitable spatula for operating on the papillomata of children. Personally, he still adhered to the fish-tail method inserted in front of the epiglottis. Lermoyez had lately divided the stages of evolution of laryngoscopy into three: the first dated from the invention of Garcia up to the discovery of cocaine. The second period dated from the introduction of cocaine up to the perfecting of the direct methods. The third period was only just beginning, and laryngologists of the present day might congratulate themselves that they were starting on what promised to be a most brilliant third period.

Mr. Waggett (London) urged those who had no extensive experience in the direct method with cocaine anaesthesia to engage the confidence of their patients by undertaking to withdraw the instruments at a prearranged signal made by the patient with his hand. One tap with the hand upon the thigh signified pain in the lips or teeth; two taps indicated the exhaustion of the patient's tolerance. By such means the period of observation was much longer than was the case where the will of the patient and of the operator came into conflict.

Mr. Stuart-Low (London) had learnt much from the excellent scientific addresses they had just listened to. He had found that by warming the cocaine solution he had required to use less of the drug, and thus diminished any danger of poisoning.

Dr. R. Scanes Spicer (London) considered endoscopy largely a question of local anaesthesia. He had used it combined with general anaesthesia for fifteen years in prolonged and difficult examinations and operations in children and adults. He used 20 per cent. cocaine with mops and sprays, but always removed all excess at once with mounted sponges, thereby diminishing the quantity swallowed, which was of no use for the local anaesthesia. He had used combined anaesthesia for over an hour by this method, the principle of application being strong solutions of cocaine on a mop not too fully charged, with free sponging to remove excess.

Dr. Permewan (Liverpool) expressed his admiration for Dr. Eicken's paper. He had learnt some of the dangers of the procedure. He considered that Dr. Hill had made a considerable advance in his modification of his instruments. He would regret any loss of dexterity in the indirect method of examination, and was glad to hear Dr. Eicken's views on this point.

Dr. N. C. Haring (Manchester) said that the usual lamps used with direct inspection instruments were of 12-volt strength. The ordinary town current might be easily used to light these lamps, by the interposition of a couple of lamps (of the voltage of the town supply) together with a sliding resistance. This apparatus could be made up into a portable box, and lamps of different voltages used with different voltage town supply. He had found hypodermic injection of $\frac{1}{150}$ grain of atropine of considerable use in minimizing the troublesome flow of mucus, especially when the patient was examined under chloroform. Cocaine solution should be used strong—20 per cent. in spirit for preference—and care taken to mop up the redundant quantity. Patients varied enormously in their tolerance of the direct method. He had had cases which had permitted the passage of Brünings's tube into the bronchi without any anaesthetic agent, local or otherwise, having been used. As for work in and about the larynx, the direct method was not, generally speaking, of much use compared with the indirect method. The special advantage of the direct method was in cases where the trachea, bronchi, and oesophagus were concerned, and in such cases diagnosis and treatment could be effected with a certainty that no other methods gave.

Dr. IRWIN MOORE (London) said that he had used Dr. Hill's instrument for the last six months, and had been pleased with the ease by which it could be introduced and withdrawn.

Dr. BROWN KELLY (Glasgow) said that in operating on intralaryngeal conditions in children it was of advantage to have the patient lying on the side with the chin approximated to the chest; manipulations were thus facilitated. He desired to call attention to the rare affection termed "cardiospasm." This for long had been recognized only *post mortem*. The patients suffered and ultimately died from dysphagia. Malignant disease was assumed to be present, but at the necropsy the only change found was dilatation of the oesophagus. Dr. Brown Kelly had a case of difficulty in swallowing, in which on passing the oesophagoscope no neoplasm was found, but the lower end of the gullet was seen to be firmly closed by the smooth mucous membrane. Attempts were made on three occasions at intervals of a fortnight to dilate the stricture. After the last the patient became ill and died in two days. The *post-mortem* examination showed extensive malignant disease of the lesser curvature of the stomach, and that the healthy mucous membrane had in consequence been pushed upwards into the gullet so as to produce the appearance observed; it also proved that the oesophagoscope had not penetrated the wall of the gullet, but that a small perforation at the junction of the healthy and diseased tissue had been produced probably by the pressure exercised. He asked how one might distinguish cardiospasm from closure of the lower end of the gullet due to cancer in the stomach.

Dr. ANDREW WYLIE (London) had found spasm and secretion a difficulty in his examination of the oesophagus and lower air passages, and he had found that 10 to 15 grains of potassium bromide with 3 minims of tincture of belladonna given four times daily for three days prior to examination greatly obviated this difficulty. The former was useful also when a general anaesthetic was employed.

Dr. J. H. BRYAN (New York) said he had been greatly interested in the improvement made in the instruments for the removal of foreign bodies from the upper air passages. If he had had the triangular spatula he probably would have succeeded in passing the instrument into the larynx in the case the President referred to. The following was a brief history of the case. A child, 6 years of age, had sucked a grain of corn into the bronchial tubes, and after an interval of a week came under his observation in a very critical state. In attempting to pass the old style spatula he found it was impossible owing to the intense traumatic swelling of the whole laryngeal cavity due to the foreign body sticking in the subglottic region. During the manipulation of the instruments the child stopped breathing, and he did a rapid tracheotomy and resorted to artificial respiration which revived the child. During the forced respiration the foreign body made several excursions past the tracheal opening, and during one of these he seized it with the forceps, thus relieving himself of the necessity of introducing the bronchoscope through the tracheal opening.

Dr. SPEIRS KIRKLAND (Sydney, N.S.W.) pointed out that bronchoscopy was not only of use in the diagnosis and extraction of foreign bodies, but also as a means of observing and elucidating conditions which were still *sub judice*, such as asthma. He had observed the bronchi contract during inspiration in cases of asthma, and in this case there was no apparent oedema of the mucous membrane. Another condition which called for remark was the great tolerance of the patient to cocaine where it was introduced into the respiratory passages only. Large quantities of a 20 per cent. solution could be injected and sprayed into the bronchi without producing any sign of intoxication.

Dr. WALKER DOWNIE (Glasgow) said that in the successful use of direct laryngoscopy there were three points of great importance; first, they must have the patient's full confidence: secondly, the examination must be made with the greatest gentleness; and thirdly, the anaesthesia should be as nearly complete as possible. The relief of pain and prevention of spasm might in most cases be successfully accomplished by the administration of bromide of potassium for two or three days prior to their examination, and the local application of a 15 per cent. or 20 per cent. solution of cocaine at the time of the examination. The source of light might be taken from the street current passed through a transformer.

Mr. THOMAS GUTHRIE (Liverpool) asked Professor von Eicken whether he had found the metallic filament lamps of any value for this method, or whether the carbon filament lamps were still indispensable. He wished to say also that, although his experience was small, he would corroborate what Professor von Eicken had said with regard to the superiority of the Kirstein lamp attached to the forehead, over the Brünings lamp fixed to the tube, in removing papillomata from the larynx in children.

Dr. DONELAN (London) pointed out that the suggestion to use bromides for subduing undue irritability in some cases was by no means new, having been used as a routine preliminary to laryngeal examination in pre cocaine days. He hoped the safe and well-tried indirect method would not be lightly set aside by any one. Reference had been made to the great skill of Morell Mackenzie in the indirect method. As one intimately associated with Mackenzie's private work, he had known him to regularly practise with a phantom larynx, or even at the removal of small objects from the bottom of a dice-box by the indirect method. If the new generation had similar perseverance, they would find there was little they could not accomplish in the examination of the air passages and operations therein.

The PRESIDENT said that in infants the larynx was so soft and small that a tube in the oesophagus might easily stop respiration. He advocated turning the child on its side and pushing up its larynx, thereby diminishing the distance to the larynx and obviating the lengthening of the neck which occurs with the child lying on its back. He had found the preliminary use of bromides useful, also the sucking of ice for from five to six minutes prior to the passing of the tube.

Dr. VON EICKEN, in reply, said that he was glad so many had taken part in the discussion, and he himself had received many valuable hints. He thought that Dr. Hill's oesophageal tubes might be useful under certain circumstances, but he himself would not recommend them in all cases, perhaps because he was accustomed to using the Kirstein forehead lamp, which rendered unessential such large-mouthed oesophageal tubes. In reply to Dr. StClair Thomson, he said that the direct method was only indicated when the indirect method failed to give satisfactory information or therapeutic ends could not be attained by it. With regard to the source of light, the connecting apparatus with rheostat for the utilization of the continuous current was now so well made that short-circuiting need not be feared. Nevertheless, it was well to have at one's disposal two sources of light: (1) The continuous current with rheostat, and (2) an accumulator. He recommended as being quite trustworthy Brünings's lamps, in which three thick carbon filaments were compactly arranged in a stellate form, and produced a brilliant spot of light. A warning against the liberal use of cocaine in young people was given, and he welcomed Mr. Stuart-Low's suggestion that warming the cocaine rendered it more easily absorbable and therefore a smaller amount was necessary. The speaker agreed with Dr. Brown Kelly that it was not always easy to differentiate between an infiltrating carcinoma of the small curvature of the stomach and spasm of the cardiac end of the oesophagus. Patients with spasm had often suffered for several years before they came for examination of the oesophagus, and even then did not exhibit marked cachexia. Oesophagoscopy also revealed marked dilatation of the gullet which was not present in such degree in gastric or cardio-oesophageal carcinoma. When in doubt an attempt should be made with the oesophagoscope (possibly under general anaesthesia) to pass the cardiac end, and, as a rule, if carcinoma were present prominent portions of the growth would be seen, and portions could be removed for microscopic

examination. In conclusion, he congratulated the President of the Section for having removed a foreign body from the gullet of a child only 4 days old—the youngest patient on record in connexion with oesophagoscopy.

Dr. Paterson in his reply referred to the usefulness of an expanding lower end to the tube to add to the lumen locally. He thought Hill's funnel-shaped tube of great convenience, and he hoped he could extend the expanding principle to it and thereby add to its usefulness. He considered rapid operation essential, and that twenty minutes should be the limit of any one sitting.

Dr. William Hill, in reply, expressed his gratification at finding that his suggestions for the simplification of technique had been so well received that he had no adverse criticisms to reply to. He was glad that Dr. Brown Kelly had raised the question of cardiospasm. Dr. Kelly had found it difficult to differentiate between carcinoma of the lower end of the gullet and cardiospasm, and asked how this could be done. The question presented no difficulty to him (the speaker) as for the oesophagoscopist cardiospasm had no objective existence. It ought to be obvious that any form of spasm, including cardiospasm, if such a condition really occurred, must disappear when the patient had been placed under a general anaesthetic, and such spasm must also have been abolished in oesophagoscopy under cocaine anaesthesia as a necessary essential for the easy passage of the tube. Out of 47 cases of growth he had examined for cardiospasm he had not once seen it, and he did not believe it existed. He had noticed a tumefaction at the lower end of the oesophagus, which was due to bilious vomiting after the anaesthetic and which might have been mistaken for the oedema of malignant disease.

DISCUSSION ON THE REMOVAL OF THE TONSILS.

OPENING PAPERS.

I.—G. Seccombe Hett, M.B., F.R.C.S.,
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THE ANATOMY OF THE CAPSULE AND ITS CLINICAL SIGNIFICANCE.

The capsule closely invests the tonsil and sends septa into that body. The supratonsillar fossa is included within it, and the blind end of the latter is only separated from the capsule by a very thin layer of lymphoid tissue. Towards the side of the tongue the capsule blends with the connective tissue which surrounds the lymphoid follicles in that situation. This lingual prolongation, usually known as the lingual tonsil, consists of two bilateral portions which in many instances form a direct prolongation of the palatine tonsil on either side, in so much as they can be removed in one continuous strip with the tonsil, when the latter is enucleated, owing to this connexion of the capsule.

The upper portion of the capsule is surrounded by a loose areolar tissue space—the peritonsillar space. There is only a potential space round the lower portion of the capsule, for the muscular fibres of the palato-glossus and the palato-pharyngeus form a close investment to it. These fibres are interlaced with one another and with those of the superior constrictor, and some of the latter are directly inserted into the capsule itself.

Blood Supply.—The vessels supplying the tonsil are the ascending palatine and tonsillar branches from the facial, the ascending pharyngeal from the external carotid, branches of the dorsalis linguae from the lingual, the descending palatine from the internal maxillary. The branches from the facial are the largest, and enter the capsule after piercing the superior constrictor. These reach the capsule in its lower part, and, running upwards, ramify on its outer surface. They then divide into branches, which pass into the tonsil along the connective tissue septa, with the exception of some which pierce the capsule at once to supply the lower portion of the tonsil. The branch from the descending palatine pierces the upper part of the capsule, and supplies the imbedded pars palatina and the posterior pillar. One or two branches of the dorsalis linguae reach the lingual surface of the tonsil, and supply the anterior pillar, the plica triangularis, and the lingual prolongation.

Relations of the Lymphatics.—The lymphatics of the tonsil run in the connective tissue septa accompanied by the vessels to the capsule, which they pierce. After ramifying on its outer surface, they form three to five trunks, which pass downwards and backwards to the point at which the muscles closely invest the capsule, and pierce the superior constrictor with the arterial branches from the facial. They then pass to the superior gland of the median deep cervical chain (jugulo-digastric), which lies on the internal jugular vein under cover of the posterior belly of the digastric. Some of the trunks pass behind, some in front of the internal jugular vein. The lymphatics of the base of the tongue communicate in the sinus tonsillaris with the above set. These supply the lingual prolongation and pass as efferents with the branches of the dorsalis linguae, then with the lingual artery to the deep cervical glands (superiores mediales). The lymphatics of the lingual prolongation and base of the tongue also communicate across the mid-line with the set of the other side, although it is not always possible to inject this anastomosis.

Comparative Anatomy.—The capsule completely surrounds the tonsil in mammalian tonsils, and the supratonsillar fossa is included within it. The simplest form is that found in the tiger and leopard, where the capsule is a test-tube-shaped sac lined with lymphoid tissue, and containing a central channel opening on the lateral wall of the foregut. The tonsil of the giraffe has a capsule very similar to that of the imbedded tonsil of childhood. It would take too long here to enumerate the various mammalian types, but a few of the more recent sections and specimens prepared by Mr. Butterfield and myself are shown here; and should the subject of the comparative anatomy interest any members of the Section, I may mention that the remainder of our series is to be seen in the museum of the Royal College of Surgeons.

Clinical Significance in Relation to Secretion.—During the act of deglutition the palate is raised and pressure is brought to bear on the tonsil from outside, and this acts especially on the movable portion of the tonsil in the peritonsillar space. The lower portion of the tonsil is fixed by the attachment to it of the muscles, and the margins of the opening of the sinus tonsillaris are kept apart by the palato-glossus and palato-pharyngeus. The upper part of the tonsil surrounded by the peritonsillar space alone is movable, and this is pressed downwards and inwards between the pillars by the action of the extrinsic muscles. The openings of the supratonsillar fossa and the crypts, as a consequence, tend to be inverted and the secretion discharged.

In relation to inflammation in chronic enlargement of the tonsil, the capsule does not become increased in thickness or undergo a corresponding hypertrophy. In tonsils which have undergone acute inflammatory changes the capsule is unaffected, but at its junction with the tonsil the pillars may become adherent. A type of tonsil common in adult life is that in which the plica triangularis undergoes a lymphoid proliferation, and then the plica with its lymphoid tissue often forms the main mass of the tonsil. In this case the relation of the capsule is apparently disturbed, although this is not really the case; it is that the plica itself may be mistaken for the tonsil proper. In peritonsillar abscess the supratonsillar fossa is obstructed, consequently the crypts opening into it from the pars palatina cannot drain. Infection spreads to the lymphatics of the capsule, and an abscess forms in the peritonsillar space. The abscess cavity corresponds to the peritonsillar space, and is limited below by the adherence of the constrictor to the capsule. This intimate relationship of the muscle with the lower part of the capsule explains why the tonsillar abscess commonly points in the palate instead of tracking downwards. In a paper in the *Journal of Anatomy and Physiology*, by Mr. H. G. Butterfield and myself, stress was laid on these points, and also on the fact that the supratonsillar fossa is really always intratonsillar, that is to say, it is always surrounded by the capsule of the tonsil. After a quinsy has been developed some days, and the palate is bulging, a probe passed up the supratonsillar fossa may be forced through the capsule, and the pus evacuated by this route. This does not allow of very efficient drainage, and is not to be recommended as

adequate treatment, but it demonstrates that the abscess has not burst through the capsule, either from the supra-tonsillar fossa to the peritonsillar space, or vice versa. After quinsies adhesions form between the capsule and walls of the space, so that the latter becomes more or less obliterated, and if the tonsil is then dissected out an artificial division has to be made instead of the tonsil shelling out. I have found that the adhesions are most marked in the neighbourhood of the anterior pillar (probably at the point where the abscess burst or was opened), and that when this point is passed the natural cleavage plane can usually be entered.

In relation to removal of the tonsils, the treatment of tonsils which are septic or subject to recurrent inflammation resolves itself into one word—removal. But round the method of removal there has raged and still rages a controversy. Let us see whether any points in the surgical anatomy of the tonsil and its capsule bear upon the much-discussed topic: (1) As to whether it is necessary to remove the tonsils with its capsule complete in the treatment of unhealthy tonsils; (2) whether, if the complete removal is necessary, how the anatomic relations of the capsule bear upon the steps necessary to effect this. Tonsils which require removal can be roughly divided into:

(*a*) Those in which the tonsil is deeply imbedded, so that it does not project much between the pillars. In these cases the pars palatina is the most developed and there is a dome-shaped mass surrounded by the capsule projecting into the peritonsillar space. This is the normal shape of tonsil in the first years of life.

(*b*) The tonsil which has proliferated mainly between the pillars and in which the capsule is flattened and the pars palatina is not dome-shaped but has retrograded. This is seen in later life, but may be combined with the previously mentioned condition.

(*c*) The small septic tonsil with little lymphoid tissue, seen often in adult life as a result of the normal atrophy of that period, *plus* cicatricial tissue—a result of old inflammation.

Forms (*a*) and (*c*) do not project and are not easily removed by the guillotine, and are the types in which a dissecting operation or form of enucleation is now generally recommended. As for form (*a*), the embedded tonsil of early childhood is usually removed because of cervical adenitis, and not because of symptoms of sore throat. Now, if removed for this reason—that is, because the tonsils are acting as a source of infection—a complete removal is indicated, for if a portion of the tonsil is left it may still continue to act as a source of infection. As for form (*c*), this is small and tough and often has adherent pillars, and sepsis, not size, is here, as generally, the determining factor, and symptoms of recurrent sore throats render removal necessary, so that here also a complete operation is indicated.

Granted, then, that in these cases at any rate a removal of the whole tonsil is required, it is obvious that the capsule must be removed in its entirety, for it forms the boundary limit of the tonsil and is closely connected with it. Now if we examine a series of tonsils, removed by the guillotine without previous separation of the pillars, we shall find that the capsule has been cut through and consequently some tonsil has been left in a large proportion, and this, whatever the means employed, whether by volsellum traction and guillotine, or by forcing the tonsil through the guillotine ring by pressure from without. The examination of tonsils removed by the guillotine will demonstrate this. It has been urged that the failure to remove the tonsil is due to the lack of practice of the operator, but I have collected a large series removed by experts on the staff of our leading special hospitals, and the result has been that very few tonsils thus removed have the capsule complete. Further, in some cases where it has been effected without previous separation of the pillars, I have seen severe haemorrhage, whereas by a properly performed enucleation this is conspicuous by its absence. In certain cases after the use of the guillotine, sore throats take place just as before the operation and in others reproliferation occurs. In a certain department where I worked for two years a black list was kept of hospitals where tonsils had been removed and which came for treatment owing to recurrent symptoms. In these cases the tonsils had been removed on one or more occasions. The list was impartial, nearly every throat department in London being equally represented.

In private practice the same thing obtains. I recently performed enucleation on a boy of 9 years whose tonsils had been removed twice by a most distinguished operator. On cutting sections through the removed tonsil, which was both large and crowded with organisms, we were much struck by the very active cell divisions in the deeper layers of the tonsil in the neighbourhood of the capsule. A similar condition was observed in another case in which I performed enucleation for continuance of sore throats, after use of guillotine, punch forceps, and cautery. Mr. H. G. Butterfield and myself have noted the same thing on several occasions, showing the necessity of the removal of the capsule, from the point of view of its neighbourhood being a possible centre for new cell division.

Lastly, the removal of the tonsil with the guillotine does not prevent the subsequent formation of quinsies; but with enucleation, and consequent removal of the capsule, there is no longer any peritonsillar space and consequently no peritonsillar abscess can form. As regards the method of operation to ensure complete removal, the essential is the primary separation of the pillars, for the capsule can then be defined, and is readily separated and removed entire with the contained tonsil by any of the various methods in vogue.

In relation to tuberculosis, we know that tubercle bacilli can be demonstrated in certain cases of enlarged tonsils, and that these tonsils themselves may show no clinical sign of the disease, although liable to be the cause of tuberculous adenitis. In these cases there is nothing to be said in regard to the capsule, beyond what has been already mentioned. In cases where there is a gross tuberculous lesion of the tonsil the resistance of the capsule to infection is seen. The tuberculous process seems to expend itself along the path of least resistance, that is, towards the pharynx. The infiltration and ulceration spreads and involves the pillars, and the lymphoid tissue is eaten away down to the capsule, without the latter giving way.

I have a specimen here from a man of 26, in whom the disease appeared as a terminal infection with advanced chest signs. I have also a patient of 26 whose tonsils I have seen at intervals for six months at the out-patient department of Mount Vernon Hospital. He has deep, excavating ulcers, but the capsule is still apparently intact, although the pillars are becoming infiltrated. A portion removed showed typical tuberculous structure and tubercle bacilli. These two cases represent the acute and chronic types respectively, and in both types the same resistance of the capsule is seen. What is true about the infective processes is also true of tumours, and has an important bearing on the treatment of the latter.

In relation to tumours, in studying malignant tumours of the tonsil such as the sarcomata, I have been much struck by the manner in which these tumours grow in lymphoid tissue and remain intratonsillar until very late in the disease, even when there are quite inoperable secondary masses in the neck, and it is this fact of the integrity of the capsule which offers suggestions as to the practicability of their removal. There are two places where these tumours tend to transgress the limits of the capsule, and these, as might be expected, are at the points where the latter becomes indefinite. They are at the pillars of the fauces and in the neighbourhood of the lingual prolongation. In removing these tumours it is necessary to leave the anterior and posterior pillars of the fauces attached to the tumour when it is removed, and also to take away the lingual prolongation in one piece with the tumour.

The choice of operation in malignant tumours of the tonsils is sometimes a question of difficulty, but if the relations of the capsule are understood, many cases can be operated on successfully by the intrabuccal method. There are several advantages in the intrabuccal operation. A large tumour can be delivered through the mouth and the integrity of the pharyngeal wall maintained. This is an advantage where an extensive dissection of the glands has to be done. Whereas by the other means a large opening into the pharynx would be necessary to remove a mass of glands in the neck before obtaining access to the tonsil from outside, and hence the risk of a pharyngeal wound communicating with the opened-up fascial planes of the neck. It is a disadvantage to have to sever the jaw, and even by von Vohsen's method there is not much room for the dissection. The advantage of the external operation is that a better view of the lower lingual portion is obtainable, and it is easier to tell what margin of healthy tissue must be taken from the side of the tongue. An advantage claimed for it is that it is possible to remove the tonsil and its infected gland in one piece as though the lymphatic channels running between

the two could be included. We know, however, from recent injections, that while some of the vessels run in front of the internal jugular to reach the jugulo-digastric gland, others run behind the vein, and still others in front of the belly of the digastric, so that a removal in continuity of all infected channels is obviously impossible. Lastly, if the relations of the tonsils are known, and we realize that in such cases these are not disturbed owing to the integrity of the capsule, a type of extended enucleation can be effected which has been in my experience very satisfactory. In addition it has the already mentioned advantage that a few days after removal of the primary growth a dissection of the glands can be effected without any risk of sepsis from the pharynx or interference of relations of structure, as after a previous opening from outside.

I have here two specimens of sarcomata of the tonsil removed by the intrabuccal method. The first is the left tonsil of a man aged 46 on whom the operation was performed two years ago. He is well and free from recurrence. The second is from a man aged 26 years, recently removed at the Throat Hospital, Golden Square, by Dr. Bond, whom I assisted. In both cases the capsule limits the disease which has been proved by microscopic section not to have involved the capsule. Recently I have seen three carcinomata of the tonsil, but in these cases the disease rapidly spread beyond the confines of the tonsil.

In the first case the disease spread rapidly on to the palate and the side of the lower jaw. In the second case there was a large mass proliferating over the anterior pillar to the side of the tongue. In the third case the lingual prolongation was the seat of the disease, and this had spread to the epiglottis and side of the tongue, causing limitation of movement of the latter. In these cases, therefore, an external operation was obviously indicated.

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ENUCLEATION OF THE TONSIL.

Complete and entire removal of the hypertrophied tonsil by dissecting it out of its bed in the pharynx has come to be the operation *de rigueur* in America. And there is much to be said in favour of tonsillectomy as compared with the incomplete operation of tonsillotomy, which is still the favourite mode of operating in England and on the Continent of Europe. Those who advocate enucleation as the routine operation summon logic to their aid. If, they say, it is improper in the surgical sense not to remove the whole of a lymph node or nodes when they are diseased, in the neck or elsewhere, then surely it is equally improper to treat an enlarged tonsil—which is, after all, a lymph node—by partial excision, seeing that in doing so we leave behind undisturbed a certain amount of diseased gland tissue. At first sight this argument looks unassailable, but it rests upon an assumption which, if not altogether unsupported, is nevertheless not entirely proved—namely, that an enlarged tonsil is invariably a diseased tonsil. The comparison of the enlarged tonsil with the enlarged lymphatic gland of chronic tuberculosis is not quite accurate. For, as is well known, no pathologist has so far succeeded in proving to the satisfaction of all and sundry that ordinary hypertrophy of the tonsils is generally, or frequently, or ever at all, due to tuberculous infection such as that which so often induces chronic cervical adenitis.

In opposition to the opinion which would lead us to take up enucleation as the routine operation for hypertrophy of the tonsils we can point to the fact that the ordinary tonsillotomy, efficiently performed, is seldom followed by a recurrence of the hypertrophy. Every one, I think, will agree that, in the majority of cases, when partial excision has been performed in childhood, the stump of tonsillar tissue which is left behind undergoes the normal involution at puberty, and nothing more is heard of it. Moreover, a critical consideration of the *pros* and *cons* of routine enucleation must always raise the question of the functions of the adenoid masses which go to form the tonsil. It may be perfectly true that their complete removal is not followed by any evidence of physiological disturbance, and we may therefore presume that, whatever their function is, it can be taken over by adenoid masses elsewhere in the body. At the same time, no one can deny that the more conservative measure of tonsillotomy as the routine practice has this to be said in its favour: It leads us nearer to the ideal *redintegratio ad integrum* than does the more complete and, if you like the word, more logical procedure of enucleation or tonsillectomy.

Without, however, labouring the physiological point too much, we may surely say that, as regards its routine employment for the relief of the mechanical obstruction which hypertrophied tonsils offer to respiration, enucleation offers no such considerable advantages as would compensate us for the general adoption of a measure which demands more from the patient and from the surgeon than does tonsillotomy. For there is no doubt whatever that enucleation is the more severe operation; it takes longer to perform, it inflicts a deeper and more extensive wound, and it demands a degree of manipulative skill and dexterity such as are not to be found save among experts. On the other hand, skill being granted, enucleation, even as a routine procedure, is not perhaps strongly contraindicated save in extraordinary cases; and for the expert to harbour an aversion to enucleation save when the tonsils are the seat of such serious diseases as tubercle and cancer, is unreasonable.

Leaving, for the moment, the routine adoption of enucleation on the one side, we now ask, Is there a class of case in which enucleation is to be preferred to tonsillotomy, as the typical operation? I think there is such a class. *Enucleation should always be performed when the tonsil is diseased and not merely hypertrophied.* To institute a distinction between disease and hypertrophy of the tonsils may seem to be rather a nice diagnostic feat. And perhaps it is. But practically speaking, the distinction is easily made. When, for example, the patient is the subject of recurrent attacks of tonsillitis or quinsy, then the tonsil may be looked upon as diseased, because events have proved that in place of acting as a rampart it has become a breach in the defences. In consequence either of the direction and disposition of its crypts, or of an actual lowering of the defensive powers of its cells, it is a source of danger to the organism of such a kind that nothing less than the complete removal of the gland and the subsequent sealing up of its site by the process of healing and cicatrization, can be relied upon to put an end to the constantly recurring invasion of septic organisms through this ever-open door.

Secondly, the tonsils should be enucleated in patients who are suffering from tuberculous disease of the cervical lymphatic glands. In most of these cases we may take it for proven that the portal of entry of the tubercle bacilli is either the tonsils or the teeth. Consequently, not only should the condition of the teeth be rendered healthy, but the tonsils should be entirely removed, even if they are not enlarged. That is to say, that no operation for the removal of tuberculous cervical glands is complete if the tonsils are suffered to remain. In taking up this position we can cite in our support the work of Mr. Scott Carmichael, who, in examining the tonsils in 50 cases of tuberculous cervical glands, found tubercle in no fewer than 7 cases. And it is to be noted that, as regards their size, the tonsils which were found to be tuberculous were actually smaller than the normal.[1]

There is another variety of the enlarged tonsil which should be dealt with by complete removal. I refer to what is known as the "buried" tonsil. In this type the gland is so completely sunk in the pit between the pillars of the fauces that without dissection we cannot remove it, even partially, with the guillotine. This particular variety is by no means uncommon even in its most marked form, while we may say that cases in which a great part of the tonsil is so concealed are fairly frequent. For these last the ordinary operation is insufficient, inasmuch as it leaves behind a large part of the hypertrophied gland, which may become a source of trouble later on.

Finally, when hypertrophy recurs after tonsillotomy has been performed, the tonsils should be enucleated.

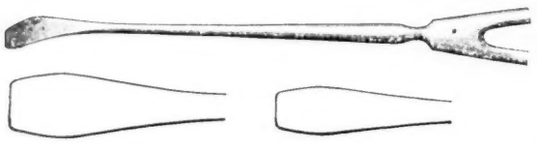
In cases which fall into such classes as these the removal of the pathological condition cannot be effected otherwise than by a formal dissection of the gland out of its fossa, since no other measure can give us the comfortable assurance that the diseased tissue is wholly and entirely removed. Simple tonsillotomy obviously does not meet the requirements of such cases. There is, however, one alternative to the operation known as enucleation, and that is morcellement. But enucleation is incomparably superior to morcellement. Complete excision of the tonsil by repeated crushing bites of the morcelleur is more difficult of accomplishment than is enucleation, and the wounds

inflicted by that instrument are more bruised and ragged than is the wound left after enucleation. Besides, injury to the pillars of the fauces is certainly as liable to occur when the tonsil is punched out, as when it is dissected out.

I shall now briefly describe the operation, and in so doing I shall mention one or two points of practical value in operating, and I shall also venture to recommend to your notice one or two instruments, the few survivors of a large number experimented with, which I have found to shorten the duration of the operation and to render it more simple and easy.

There is no need for us to recapitulate in detail the anatomy of the tonsil. It will suffice to mention the features which interest the operator:

Embedded in a shallow pit between the anterior and posterior pillars of the fauces, the tonsil rests upon a fascial layer which separates it from the superior constrictor muscle of the pharynx, and it is by cleaving this layer that we excise the tonsil. Round its edges the tonsil is attached by a fibrous band to the mucous membrane, an attachment which is particularly firm above, and also in the neighbourhood of the anterior pillar. Moreover, from this pillar a band or process of fibrous tissue passes backwards and downwards, to merge into the lower surface of the gland in such a way as to sling it or support it like a hammock. The separation of this tough and elastic fibrous process from the anterior, and to some extent from the inferior, surface of the tonsil is the first step in the operation. Many operators effect the severance or separation by means of a snip with scissors, but I am in the habit of using a dissector made by Messrs. Mayer and Meltzer, which



I have found to answer very well. It possesses the great merit of simplicity, and, as it can be used for freeing the rest of the tonsil, its employment saves time in that it does away with the necessity of changing instruments during the operation. The tongue being well depressed, and under the guidance of a good light, the dissector is slipped between the anterior pillar and the tonsil, and made to sweep down as far as its lower surface. Then the tonsil is seized with a pair of forceps and gently pulled out so as to define its upper attachment. I have tried many forceps for this purpose, beginning with an old-fashioned uterine vulsellum, but there are none so satisfactory as Mr. Tilley's, which I can most confidently recommend. The next step is to cut through the fibrous membrane binding the upper pole of the tonsil to the mucous membrane so as to reach the fascial layer mentioned above. Once in the fascial layer, further separation can be easily accomplished either with my dissector, or with Mayer's serrated dissector, or even with the finger, and presently the gland is detached all round save at its lower pole. This final attachment should not be cut through until we are sure that we have got all the rest of the tonsil freed from its connexions. I ought to mention that once the forceps are fixed in the tonsil they should not be loosened until the tonsil is in the basin. The attachment at the lower pole is, of course, partly adenoid tissue and partly fibrous membrane, and it can be cut with scissors, knife, or, what is better and safer, a snare or tonsillotome slipped over Tilley's forceps, which are so devised as to permit of this being done.

Having thus excised one tonsil, we turn to the other, and deal with it in exactly the same way. The enucleated tonsil presents on its outer aspect a fascial covering, and its edge is fringed with the remains of its membranous attachment or ligament. That is to say, the tonsil is removed entire, the tonsillar tissue not being cut into at all.

An inspection of the tonsillar fossa after enucleation reveals a smooth bleeding area sunk between the faucial pillars, and so hidden by the anterior pillar that the patient's head must be turned well to one side before we can discern it. On the anterior surface of the posterior pillar, near its base, the spouting tonsillar artery—a branch of the ascending pharyngeal—can be seen, of which more anon.

Difficulties.—As I have already hinted, enucleation of the tonsil is not an operation which the inexperienced can hope to perform with ease and celerity.

The first and most important point to be attended to is that of reaching the extratonsillar fascial plane. If this is done, enucleation takes place of itself; if not, the operation is spent in shallows and in miseries. Secondly, we must be careful not to carry our dissection deeper than the fascial layer, otherwise the superior constrictor muscle of the pharynx will be seriously injured—an accident which may perhaps be followed by a weakening of the voice-producing mechanism.

To reach the proper plane the tonsil must be pulled out a little with the forceps, so that its upper pole is clearly defined, and for this purpose a bright illumination is called for. I prefer to have the patient in the sitting posture, for in this attitude our view is less impeded by the pharynx filling with blood. A good anaesthesia is a *sine quâ non*. I generally operate under gas and ether, but the operation can also be performed under local anaesthesia in suitable subjects. If chloroform is used, the patient must, of course, be placed in the recumbent position.

Dangers.—Risk of wounding the internal carotid or jugular is non-existent, unless the operator loses control over his sharp instruments. So it may be dismissed without any more being said.

The other dangers are (1) injury to the pillars of the fauces; (2) haemorrhage; (3) sepsis.

The faucial pillars are liable to be cut if the operation is performed with an ordinary bistoury or with a knife the curve of which is too gentle. But the accident may occur with the most perfect instruments in the world if the operation is performed blindly or hurriedly. On the other hand, deliberation, precision, and good illumination rob the operation of its terrors so far as the pillars are concerned. At the same time, division of a faucial pillar is not a serious accident, although it spoils the artistic effect of the operation, and some people affirm that it impairs the singing voice. This may be a superstition; all the same it is better not to have the question raised at all.

The fear of excessive haemorrhage seems to be the bugbear of the operation in England. Yet the Americans declare that there is actually less bleeding after tonsillectomy than after tonsillotomy. So far as my own experience goes, I should say there is very little difference between them, but there is no doubt that the sight of the spouting tonsillar artery is somewhat disquieting. This vessel soon stops, however, especially if hydrogen peroxide is applied to it, and in any case it is not difficult to catch it up with long artery forceps, if the need arises.

Thirdly, septic infection of the tonsillectomy wound may occur, and it is a more serious complication than septic infection of a tonsillotomy wound. In both operations, however, it can be prevented by attention to cardinal rules, especially as regards the mouth and teeth. Septic conditions about the mouth (carious teeth, pyorrhoea alveolaris, etc) should be got rid of before the operation is undertaken.

RESULTS.

If a tonsil is properly enucleated recurrence of the hypertrophy is impossible, tonsillitis is a thing of the past, and the fear of cervical glands becoming infected from this source is for ever banished.

By way of criticism of the operation, some observers in America report that the singing voice may be impaired by the filling up of the tonsillar fossa with cicatricial tissue, whereby the action of the pharyngeal muscles is impeded. The reply to this criticism is that the same reproach is also frequently levelled, generally without reason, against the ordinary operation of tonsillotomy. At the same time, one would be very cautious of recommending enucleation to a professional singer for obvious reasons.

Before ending these remarks on enucleation it is fitting to say that, as nearly all operators know, the freeing of the anterior pillar from the anterior surface of the tonsil before applying the tonsillotome in the ordinary operation enables us to remove a large portion of tonsillar tissue which otherwise remains behind, protected as it is from the cutting blade of the instrument by the faucial pillar. In conclusion, I think we may express the opinion that enucleation of the tonsil is a clean, complete, and radical procedure, imperative in some types of tonsillar enlargement, advisable in others, and not contraindicated in any variety save and except for reasons which would also exclude the simple operation of tonsillotomy.

REFERENCE.

[1] E. Scott Carmichael, Tuberculosis of the Tonsil associated with Tuberculous Glands of Neck, *Proc. Roy. Soc. Med.* (Section of Study of Diseases of Children), November, 1909, p. 27.

III.—StClair Thomson, M.D., F.R.C.P, F.R.C.S.,
Professor of Laryngology and Physician for Diseases of the Throat, King's College Hospital.

Dr. StClair Thomson reminded the meeting that enucleation of the tonsils with the finger was described by Celsus in A.D. 10. He himself had recommended the method and described his way of doing it in the *Transactions of the Medical Society of London* some ten years ago. Needless to say, therefore, he had no prejudice against the proceeding; but it was not the only method, nor did he think it was even the method most generally required. Mr. Hett's statistics of unsatisfactory results from the guillotine operation were of little value. They were drawn from out-patient practice, and every one knew that in most clinics the department was so overworked, and the skilled assistance so insufficient, that few seniors were satisfied with the way their tonsil and adenoid cases were completed. The speaker objected to the word "enucleation" being limited to removal of the tonsil by a process of dissection. The correct way to describe it was "tonsillectomy by dissection," for he could produce positive evidence that the tonsil could be as completely and entirely "enucleated," intact in its capsule, by the ordinary guillotine. The speaker then gave a demonstration of his method of "enucleating" the tonsil, after pulling it through the ring of the guillotine. The method was illustrated by drawings, and the specimens handed round showed the gland intact in its capsule, including even the supratonsillar fossa.

The objections to "dissection" had not been insisted on by Mr. Hett, but had been acknowledged by Dr. Dan McKenzie. The chief ones were:

(*a*) The necessity for special skill,
(*b*) The need of a particularly expert anaesthetist,
(*c*) The profound anaesthesia recommended by many supporters, and
(*d*) The possibility of injuring the faucial pillars.

With the guillotine, the bleeding was sharp at the time, but he had only had some three or four cases of secondary haemorrhage causing any anxiety; they were all in adults, and he had had no accidents whatever. In the profound anaesthesia generally recommended for enucleation by dissection he had seen the patient deeply congested, with his head extended and his pharyngeal reflex entirely abolished. In such a condition any undue traction on the tonsil led to laryngeal spasm, and he could not help thinking that all such patients were much closer to the verge of danger than those in whom the swallowing and coughing reflex were carefully preserved. The specimens handed round entirely refuted the statement that tonsils could not be completely enucleated with the guillotine.

His conclusions were that, in practised hands, the guillotine was still the most suitable instrument for the average condition of enlarged tonsils and certainly for all pedunculated tonsils in children. The method by dissection might be required for cases with marked adenitis, and for such tonsils as could not easily be drawn into the guillotine ring.

DISCUSSION.

Dr. J. S. Bryan (New York) said that the use of hydrogen dioxide was very useful in controlling haemorrhage following tonsillotomy, but it had its dangers. A fatal case occurred in Pittsburg, which of course was not reported. The haemorrhage was profuse; hydrogen dioxide was freely applied; the resulting foam filled the fauces and larynx, and the patient was asphyxiated.

Mr. E. B. Waggett (London) said that, in discussing a subject such as that just introduced, it was important to eliminate points not essential to the argument. It had been suggested that the operative removal of the tonsil, with its capsule complete, introduced the elements of complexity and of danger, but in the speaker's experience enucleation entailed no danger which the classical use of the guillotine with general anaesthesia did not also entail. The technique was so simple that any student might be trusted to learn it, always provided that no sharp instruments were used. Any flat or "hidden" tonsil could be removed with perfect ease and with its capsule complete by means of a pair of forceps, a strong écraseur snare, and a blunt curved raspatory. As a raspatory he preferred a pair of closed scissors curved upon the flat; Luc's fenestrated nasal polyp forceps was a very suitable grasping instrument, and he had no objection to the use of a small-sized but blunt guillotine in place of the snare. The blunt forceps previously threaded through the snare loop, took a deep grip of the head of the tonsil and traction was then made towards the middle line. The tip of the closed scissors or raspatory was inserted into the supratonsillar fossa and the capsule perforated. As soon as air was, by this means, admitted between the muscular wall of the pharynx and the capsule, the latter turned inside out if traction were maintained. The upper part of the tonsil emerged from between the pillars and projected as a cauliflower-like body into the mouth. If a few strokes were now made with the closed scissors in front and behind, the lower part of the tonsil followed suit, and the whole tonsil in its evaginated condition presented as a definitely pedunculated body. Constriction of the pedicle, with the snare loop, completed the operation—the whole proceeding having occupied not more than sixty seconds. It was certainly easier to perform than to describe. Some operation of this kind had, in the speaker's experience, been in vogue for a great many years where flat or hidden tonsils were concerned, and he did not think that it was possible to devise a simpler or more certain method of removing the entire capsule. For one new point he was indebted to Vacher, of Orleans, at whose suggestion he employed two snares instead of one. The snare used upon the first tonsil was not screwed fully home, but was supported by the nurse, until the second tonsil was attacked. In this way both tonsils were dealt with upon a bloodless field. Some little care must be taken to ensure the severance of the plica from the anterior pillar, but the whole operation was simplicity itself, and occupied two minutes. By the avoidance of sharp instruments and the haemorrhage their use entailed, the question of complexity was eliminated from the problem. As to danger, he had, among many hundred cases, seen but one instance, and that a trivial one, of post-operative bleeding. This favourable experience was what one might expect of an operation in which the blood vessels were crushed through by blunt instruments. Concerning anaesthesia, it must be admitted that this method of operation entailed a general anaesthetic. Complete removal of hidden tonsils with their capsules was under local anaesthesia either distressing or tedious. A few fatalities had occurred under general anaesthesia, and a few also under local anaesthesia. In either case the element of danger was not wholly negligible, but in general anaesthesia it was extremely slight if the administrator were experienced. This he should always be where throat operations were concerned, seeing that he must of necessity play the double rôle of anaesthetist and assistant, for his channel of administration was also the field of operation. Among perhaps twenty thousand operations under general anaesthesia, a large proportion of them in the sitting posture—that best suited for the operation under discussion—he had seen no fatality and very few anxious interruptions. Where the anaesthetist realized the importance of his function and, in addition, habitually made use of a tongue clip, the anaesthetic danger was reduced to such small dimensions that that question might also fairly be eliminated from the argument.

Dr. William Hill (London) remarked that he had entered the room with a very open mind, and he had rather expected that there would be a large consensus of opinion against the use of the guillotine alone, and in favour of a combination of dissection *plus* the guillotine. Hitherto, in his own practice, he had adopted an eclectic position; in hospital practice he relied on the guillotine alone in the large majority of cases, reserving a preliminary dissection for those cases where there were septic deposits in the crypts, and in the case of buried tonsils. In private practice, on the other hand, he relied on the guillotine alone in only a small proportion of cases, and the number of these operations were being reduced almost to vanishing point in view of the possibility of imperfect removal and the remains of the tonsil growing as large as ever again. In fact, it had become a question with him whether he was doing his utmost for his private patients if he neglected to combine dissection with the use of the guillotine or snare. Only the day before

he had been painfully reminded of failure in a private patient through reliance on the guillotine alone If dissection were resorted to, it necessitated a longer anaesthesia and a more expert operator than was always available in hospital practice, where clinical assistants dealt with the majority of cases, and in cases treated by general practitioners. In the combined operation of partial dissection followed by the guillotine or snare, he was not content with merely separating by dissection the tonsil from the anterior and posterior pillars, for he found that a complete extracapsular removal was much more consistently effected by separating with a dissector the superior pole of the tonsil as well. Mr. Hett deserved great praise for the thoroughness of his studies on the anatomy of the tonsils, both human and comparative. He was a little surprised, however, to find that he still retained the misleading term "*supra*tonsillar fossa." Mr. Hett's dissections and microscopical sections clearly showed that this fossa was within the capsule, and was therefore *intra*tonsillar. Dr. Dan McKenzie, in his very able communication, was careful to use the more correct term, "tonsillar fossa," a term which had the support of embryology. Mr. MacNeill Hardy had contributed a paper to the Section in 1908, and again in 1909, in which he pointed out current misconceptions in the anatomy of the tonsil and its capsule, insisting on the intratonsillar position of the "crypta magna" or palatal recess, and objecting to the term "*supra*tonsillar fossa." Dr. Watson Williams and Dr. R. D. Paterson had endeavoured to controvert Mr. Hardy's statement in the correspondence columns of the JOURNAL, and apparently no one had been willing to give Mr. Hardy the slightest support, yet it would now appear that Mr. Hardy's contentions were absolutely correct. Dr. Thomson contended that a complete enucleation could be effected with the guillotine, and Mr. Waggett had very truly asserted that this could often be accomplished with the snare alone. He had carefully scrutinized the specimens just shown by these operators in order to see whether the capsule was generally intact, especially in the region of the palatal recess—that is, tonsillar fossa—and he found that all the specimens stood the test, and were complete enucleations. On the other hand, a small number of Mr. Hett's specimens were not absolutely complete excisions, the tonsillar fossa not being completely removed; the amount of tonsillar tissue left behind was, however, not worth mentioning. When he assisted Lennox Browne, more than twenty years ago, he was taught to use the snare. That surgeon used an écraseur with a thick silver wire, somewhat resembling the uterine instrument. Lennox Browne also taught that if one decided on using a guillotine, one should always select an instrument that appeared to be two sizes too small. In conclusion, the speaker entertained no doubt that an operation which included dissection could show a far higher percentage of practically complete removals than could be obtained by the most expert use of the guillotine or the snare alone.

Dr. DUNDAS GRANT (London) said that, although it could not be denied that very excellent results constantly followed the removal of tonsils by means of the guillotine, he had had searchings of heart with regard to the use of its routine practice, and he had himself exercised a certain amount of eclecticism in the choice of operation. He considered that the leaving of a portion of tonsil tissue as such was not a serious matter, and indeed possibly a beneficial one so long as the crypts were cleared away. Moreover, the protective character of the capsule had already been pointed out, and its complete removal was open to question. He advised complete enucleation when there were recurring attacks of tonsillitis or quinsy, or infection of the cervical glands, or unexplainable feverish or rheumatic attacks. When he wished to enucleate he used a blunt-pointed cutting hook for detaching the upper pole of the tonsil and the pillars of the fauces, especially the triangular plica. He agreed with Dr. Thomson as to the methodical turning of the guillotine so as to include the lower pole of pendulous tonsil, as described with great minuteness in a former issue of the *Clinical Journal* by Mr. Mark Hovell. Dr. Grant used Ruault's morcellement instrument for the removal of tonsils in young adults, as it was in them that post-operative or secondary haemorrhage was apt to occur when the guillotine was used. Very large and somewhat pedunculated tonsils could be removed and indeed most beautifully enucleated by means of the écraseur.

Dr. LUC (Paris) said that since many of his English colleagues appeared to be, like himself, supporters of the cold snare for the removal of tonsils, he felt bound to call their attention to a modification of a short instrument that was proposed by Vacher of Orleans at the last meeting of their French Society. It was called the rigid cold snare, and consisted of two metallic rings with blunt edges which slid one against the other by means of a screw. This instrument was always ready to work, and saved the operator loss of time required by the preparation of the wire in the ordinary snare. The question of anaesthesia was a delicate and important one as regards the operation considered. The limited time secured by such general anaesthetics as ethyl chloride or somnoform (since they generally abstained from using chloroform in such cases) was undoubtedly a source of difficulty, and required skilfulness and quickness in operating. For that reason, when operating on adults, he preferred having recourse to local anaesthesia under the form of a solution of novocain (1 in 100), which was previously injected into the gland, the pillars, and the neighbouring region of the base of the tongue. He disposed thus of an unlimited duration of anaesthesia which enabled him to operate without the least hurry.

Dr. DONELAN (London) said that in the last twenty-two years he had removed many thousands of tonsils. He had chiefly used the Mackenzie guillotine as modified by himself. He had had the advantage, owing to the situation of his hospital, of knowing the after-history of a great many of these patients, and he believed that in the great majority of cases, especially of young children, the guillotine operation, combined with previous freeing the tonsil when necessary, was all that was required. He had performed enucleation in a great many cases, but only in those of so-called removal of imperfectly removed tonsils. In these, after trying various instruments, including scissors and forceps, he had found a modification of Löwenberg's adenoid forceps extremely useful, and it was possible with the guidance of the finger to remove every particle of tonsil. He strongly supported the view of Dr. StClair Thomson that general anaesthetics should always be given by an expert in throat cases. The anaesthetic should never abolish the cough reflex.

Dr. WATSON WILLIAMS (Bristol) asked if it was certain that it was always desirable completely to remove the tonsil instead of employing a method which yielded a partial removal. To his mind this must remain an open question until they had more definite knowledge of the functions of the tonsils and other naso-pharyngeal aggregations of lymph tissue. He might say that many years ago he endeavoured to trace the influence of the tonsils as a source of rheumatic infection, and concluded that patients whose tonsils were enlarged were less prone to rheumatic fever than those whose tonsils were atrophied—at any rate, he thought it quite possible (he purposely went no further) that patients who suffered from acute rheumatic tonsillitis were often protected by the local infective attack from its becoming a general systemic infection. They might prevent absolutely any further trouble in a tooth by its extraction, but it did not follow that a dentist should therefore invariably extract a diseased tooth. Enucleation, however, had many advantages, and he did not think it was an operation which necessitated great skill or long practice. He used a forceps which firmly grasped the tonsil and enabled one to thread a snare or guillotine over it. He thought ether, followed by chloroform, was the safest anaesthetic, and if $\frac{1}{200}$ grain to $\frac{1}{150}$ grain of atropine sulphate were injected from one-half to one hour beforehand the operator was assisted by the marked lessening of secretion and saliva. If haemorrhage was troublesome he put on a compressing clamp, which had never failed to completely control bleeding, but he thought there was less haemorrhage, if anything, after enucleation than after tonsillotomy.

Mr. H. LAMBERT LACK (London) had heard nothing to convince him that enucleation should be the routine

operation for removal of enlarged tonsils. The ordinary guillotine operation, performed skilfully, gave results in every way admirable. Enucleation should be reserved for cases of disease, such as quinsy, recurrent tonsillitis in deep lying flat tonsils, and so on. Statistics of recurrence, drawn at random from hospital practice such as Dr. Hett's, were absolutely valueless, as there was no proof the tonsils were properly removed in the first instance. The advocates of enucleation who desired removal of the last vestige of every crypt were not logical, as they took no note of the other lymphoid crypts in the pharynx; they should advocate removal of the entire ring of the pharyngeal lymphoid tissue.

Dr. W. S. Syme (Glasgow) had made use of enucleation, snaring, and tonsillotomy as operations for tonsillar disease, and was not convinced that the first of these methods should be the routine one. It was difficult to decide in any given case which should be employed. Yet it was important, because there was no doubt that, though the performance of enucleation was simple enough, the fact that in children, at any rate, deep anaesthesia was required, added an increased risk; moreover, the period of convalescence was longer. On the general question he thought there were cases for which tonsillotomy was sufficient; there were others where enucleation should be performed, and it should be their endeavour to decide more definitely upon the indications.

Mr. Stuart Low (London) said that he was strongly in favour of the method of enucleation for the removal of enlarged tonsils in adults in certain forms of hypertrophy. He did not think that enucleation would ever become the routine method in children, as in them the tonsillotome was still much the best instrument, because the tonsil had, in the great majority of children, a pedunculated attachment. Where this was the case it was not desirable to employ enucleation, for a number of reasons, one being the prolongation of the anaesthesia and the greater risks that this incurred. In the case of adults, however, enucleation was often the best way of getting rid of a troublesome and enlarged tonsil. Whether to enucleate or not was to be decided by the way in which the tonsil was attached. If by a long attachment, extending sometimes from apex to base, there was no better way than to enucleate. The speaker then showed specimens of tonsils which had been taken away by being enucleated, and laid stress on the importance of paying attention to the shape of the tonsil and how it was fixed in the tonsillar fossa. He used two instruments only, a special form of securely grasping vulsellum forceps, and a pair of curved scissors. With these instruments the operation was simple, swift, and safe, and he had no hesitation in saying that given proper patients and practised performers enucleation was the perfect operation.

Dr. Pegler (London) was glad Dr. Dundas Grant had alluded to morcellement as they performed it in England, and which, he believed, was quite different from the morcellement of Ruault. He felt some surprise that so little reference had been made to this valuable method in the discussion. He had continued to practise it in suitable cases since its first adoption, and still advocated the handy little Hartmann conchotome for the purpose, as set forth in the short paper which he read at the Cheltenham meeting. As in many another class of operation, surgeons preferred to adopt the plan with which they met with the best success.

Mr. Seccombe Hett, in reply, said Dr. William Hill had very rightly pointed out the absurdity of the name "supra-tonsillar fossa," and he had only retained it because it was so time-honoured that he did not venture to rechristen the recess. He thought, however, that "tonsillar fossa" would be a better term. In some of the cases in which he had managed to remove an imbedded tonsil entire without previous separation of the pillars he had had severe haemorrhage. By a dissecting operation a complete removal of the capsule and its contained tonsil could be absolutely ensured. In a properly performed enucleation haemorrhage was slight, at any rate in children, and he preferred to dissect out the tonsil, thus tearing rather than cutting the vessels, which then retracted and did not bleed. Dr. StClair Thomson and others had objected to the depth of anaesthesia required and the consequent increased risk of operation and necessity for a skilled anaesthetist. But surely a deep anaesthesia in itself was not dangerous, and in it lay safety, for the absence of gagging and swallowing prevented haemorrhage obstructing one's view, or the patient's respiration, and allowed of a certain, quick and neat operation. Mr. Waggett had discussed enucleation by the snare and had said that the operation could be done in two minutes and also bloodlessly, but by dissecting off the pillars and enucleating, the average time taken over a series of cases was one minute over each tonsil and one minute to change sides. Moreover, he had seen the snare cut through the lower part of the capsule and it sometimes left a bruised stump at the attachment of the constrictor, which was said to cause considerable pain in some cases. Mr. Waggett had emphasized the point about the sitting-up position for the anaesthesia. If, however, the tongue were pulled out by a suture passed through it, and the tonsil and anterior pillar were drawn forward, the operation was then very much facilitated, while the recumbent position had the obvious advantage of allowing the throat to be more easily mopped out if necessary. Dr. Stuart-Low objected to enucleation in children because of the anaesthesia, but surely children, owing to their young and healthy tissues, were the best subjects for anaesthetics. Again, as he had already pointed out, the operation was especially called for in young children, owing to the tonsil of childhood being deeply imbedded, and also that operation was more often indicated because of cervical adenitis than for sore throats, and it was particularly necessary in them to remove the whole tonsil. Mr. Stuart-Low said that there was muscle on the capsules of the tonsils, and that consequently there must be a wound of the pharynx. The reply to this was that in a microscopic section of a capsule which had been removed muscular fibres could be demonstrated, for the constrictor obtained a direct insertion into the capsule. The specimen which Mr. Stuart-Low showed was that of a large projecting tonsil with little imbedded portion, and was the type that could be removed almost, if not quite, complete with the guillotine. Even so, the specimen could not be regarded as one of complete removal, for, as pointed out by Mr. Herbert Tilley, a portion of the capsule was missing and exposed crypts, which had been cut through, were seen.

Dr. Dan McKenzie, in reply, said that, while the discussion had revealed many differences of opinion with regard to the best methods of operating, it was also shown that there was a fairly general agreement in regard to one of the principles formulated in his paper—namely, that in recurrent hypertrophy and in disease the tonsil should be so completely excised that no trace of tonsillar tissue remained behind. This expression of opinion was one of great importance.

Dr. StClair Thomson, in his reply, said that he was agreed that any tonsil which called for removal should be removed entire with its capsule. At the same time they must keep their minds open in view of what they had heard that morning in regard to the defence which this capsule offered against the spread of malignant disease or invasion by the tubercle bacillus. With regard to the objection that haemorrhage was more frequent with his method, he still felt that he would sooner have the short, sharp bleeding of the guillotine than run the risk of the profound anaesthesia required for the dissection method. He therefore adhered to his conclusions—that the guillotine had not been dethroned, and that the method by dissection had its limitations.

An International Exposition of Social Hygiene will be held in Rome in 1911, under the presidency of Professor Baccelli.

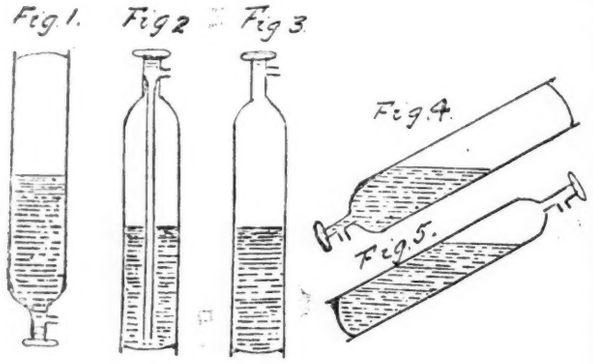
The Chemical Industries Committee of the British Royal Commission is taking steps to make the British chemical court at the Turin Exhibition next year thoroughly representative of the chemical industry of Great Britain. The Committee contains representatives of all branches of the industry. Further particulars can be obtained from the Director of the Exhibitions Branch, Board of Trade, Queen Anne's Chambers, Westminster, S.W.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CARBON DIOXIDE SNOW.

THE use of solid carbon dioxide snow as a therapeutic agent has been very fully described in various journals during the past few months, and at the recent annual meeting of the British Medical Association several interesting demonstrations were given. Many good methods for collecting the snow have been suggested, some simple and others elaborate, and excellent apparatus has been invented and prepared by different makers to prevent waste, and to obtain easily a hard pencil or stick of the solid snow. One simple but highly essential and practical point requires emphasis, and, unless understood, some may procure cylinders and collecting apparatus, and yet meet with disappointment in not being able to obtain any snow. When the valve of the cylinder is opened, the liquid carbon dioxide must be forced out, and not simply a jet of high-pressure gas. It is a portion of the liquid gas which solidifies in the form of white snow-like flakes, and this is caused by the great absorption of heat produced by the very rapid evaporation of another portion. Consequently the cylinder must be placed on a stand upside



down, with the valve at the bottom, as in Fig. 1, or in an inclined position, as in Fig. 4, so that the liquid gas is gravitated down to the nozzle end, and must of necessity be forced out when the valve is opened. The cylinder, if fitted with a central siphon tube (Fig. 2), may be kept in an upright position, and in a stand similar to that supplied with oxygen cylinders. As this siphon tube is attached to the nozzle, the pressure must first press out the liquid CO_2 from the bottom of the cylinder. If the cylinders are placed as in Figs. 3 and 5, the gas will simply rush out with great noise and be wasted. The cylinders used by aërated and mineral water manufacturers are usually about 5 ft. in length, and contain some 27 lb. of gas. This large size cannot well be inverted, and, if used, must be placed on a suitable stand, as in Fig. 4 position. Smaller cylinders of 7 lb. capacity, however, are being supplied by most of the carbonic acid gas companies, and are, therefore, more convenient. The pressure or tension contained in the cylinders is from 850 to 1,000 lb., but varies, of course, with the temperature. The cooler the atmosphere the lower the pressure. On an average it is probably about 950 lb. to the square inch, or 65 atmospheres. Liquid CO_2 has a coefficient of expansion larger than that of any known body, and its boiling point is $-72.2°$ under a pressure of 760 mm. The temperature of the snow is 79° below zero (Centigrade).

S. W. ALLWORTHY, M.A., M.D. D.P.H.,
Fellow of the Chemical Society; Physician, Belfast Hospital for Diseases of the Skin.
Belfast.

THE next International Congress of Psychiatry will be held at Moscow in 1912.

A RADIUM institute is to be opened in Vienna on November 28th. It is somewhat remarkable that no provision appears to be made for medical research in the institute.

British Medical Association.

CLINICAL AND SCIENTIFIC PROCEEDINGS.

METROPOLITAN COUNTIES BRANCH: HAMPSTEAD DIVISION.

Dr. FORD ANDERSON in the Chair.

Mental Therapeutics.

AT a meeting of the Hampstead Division held at the Central Library, Arkwright Road, on November 11th, Dr. H. CAMPBELL THOMSON read a paper on mental therapeutics, with special reference to Freud's and other methods of treatment. He started by saying that he proposed to deal only with the milder mental disorders, such as those included in hysteria, neurasthenia, and psychasthenia, and would not speak of insanity. Psychic methods should be systematized on a proper foundation, in order that they could be taught like other methods in medicine. Mental processes were governed by definite laws, and every thought and act was a logical sequence of a past experience in the normal mind. The newborn child had no ideas, and the child brought up out of reach of human intercourse could acquire no higher thoughts than those necessary for preservation of existence. Dr. Campbell Thomson illustrated the education of the nervous system by the process of association of ideas. A new idea linked itself up with ideas of a similar nature. In this way it found its proper place and proportion in the system of ideas. Turning to the subject of the subconscious mind, he explained this by stating that every one performed many actions without the full cognizance of the mind. Walking, for instance, was performed automatically, and during the act the mind was free to acquire fresh ideas. Illustrations were given both by instances and by diagrams of the subconscious working of the mind. He emphasized the fact that an interference of the conscious mind with the working of the subconscious mind might result in the hampering of the action. The most important processes of the normal mind were association of ideas and the relegation of familiar actions to the subconscious mind. These processes might become deranged by the associations becoming weak or faulty, so that the ideas were not kept in their proper proportion to general experience, by what Janet called "dissociation," and by the failure to associate painful events. Dissociation was supposed by some to account for the greater number of symptoms in hysteria. Freud found that painful sensations were worked off normally by suitable reactions, such as the use of strong language in response to an insult, tears in response to grief, etc. If no relief was obtained, a painful experience might fail to be duly associated with other experiences. The impressions were, then, kept outside the personality of the individual, and might be regarded like a foreign body. Since they were painful to the individual, they gradually become pushed out of the conscious mind and relegated to the subconscious mind. Freud's method involved the attempt to link up the submerged experience with the consciousness of the person. This was accomplished by the method of psycho-analysis. Freud at first attempted this with the assistance of hypnosis, but later gave it up for his more simple method of "free association." Free association consisted in persuading the patient to give out his thoughts indiscriminately without self-criticism. The difficulty met with was due to the fact that the patient was unconsciously repressing the offending source. Another means employed by Freud was a system of analysis of dreams. The speaker disposed of this subject briefly, since he stated that it was too long and too intricate to be adequately dealt with in this lecture. Next he passed on to the method devised by Jung of word association. He illustrated this method by an example. The physician chose a set of words which were termed *stimulus words*. The patient had to say the first word which the stimulus word suggested. This was termed the *reaction word*, and the physician timed the interval. The process appeared to deal rather with the emotions than with the intellect. By observing the type of words which produced delayed reactions and employing further words connected with similar subjects it was possible to interpret the hidden com-

plexes which influenced the patient's actions. The example given revealed a suicidal tendency with special impulses to drowning. In this case, while the majority of the ordinary words, such as "head," "green," stick," etc., were followed by rational reaction words within 1.4 to 1.6 seconds, "water," "ship," "swim," and the like called forth a special type of reaction words after an interval of 3, 4 to 5 seconds. The speaker then touched lightly on the hypothesis enunciated by Freud, that buried complexes in hysteria were connected with sexual ideas. He agreed with Bernard Hart, who did not consider the sex theories as the most important part of Freud's work. Freud had certainly helped to clear up difficulties with regard to the relation between the conscious and the subconscious areas of the mind. Psycho-analysis took too long and was too difficult to become a general form of treatment for the cure of hysteria, but Dr. Campbell Thomson believed that the principle might be found useful in some cases of psychasthenia and neurasthenia. Lastly he dealt with suggestion and with persuasion as described by Dubois. Suggestion apart from definite hypnosis was the power of some persons to impress their personality on others. It was very useful when properly applied, but its field of action was limited by its superficiality. Persuasion appeared to stand half-way between suggestion and psycho-analysis; it was deeper than the former, and less deep than the latter. He advised the physician in dealing with a disturbance of the mental function first to determine whether he could help at all; next he should endeavour to construct in his own mind the morbid psychology of the case; and, lastly, consider how the morbid condition could best be changed into a normal condition. It was necessary to exercise the greatest care in estimating the mechanism of another person's mind, for in no department of medicine was the physician more likely to err by finding what he expected rather than what really existed.

Dr. H. E. Wingfield spoke of his experience of hypnotism in the treatment of hysteria, neurasthenia, and similar conditions. He admitted that he had seldom used psycho analysis in this class of patient. He thought that Dr. Campbell Thomson had taken too narrow a view of the subconscious mind. He had studied the subconscious mind during hypnosis. During the waking state the subconscious mind was capable of carrying out very many intellectual actions. He gave examples of hypnosis with post-hypnotic suggestions which he had induced in undergraduates at Cambridge and others. In one case a man had written stanzas on the May races at his command, without any knowledge of the hypnotic suggestion, although the actual composition of the verses appeared, in part at all events, to have been carried out in the waking state. His experience went to prove that the subconscious mind performed many other functions besides those which could be regarded as automatic. In turning to therapeutics, he found that drink cases were especially well adapted to hypnotic treatment. If the patient had the good will to get better, he could always be either enormously improved or entirely cured. He illustrated the power of curing laziness by means of hypnotic suggestions. In discussing the systems of psycho-analysis, he found that they were all almost impracticable for ordinary practice. This was well exemplified in the dream analysis method. He illustrated this form of analysis by reciting the salient points of a case of physical pain caused by disappointment in love. The patient found her mental agony intolerable and therefore unconsciously transformed her symptoms into bodily pain which she could easily bear. The analysis was laboriously performed without the assistance of hypnosis. He doubted whether this method could be used in ordinary practice for gain. The patient would have to be seen daily or several times a week for many months or even years, and if each visit were charged for it would cost the patient hundreds of pounds before the physician had discovered the buried complex. There was another method of obtaining the same results, which had not been mentioned. This was by passing an electric current through the body and through a galvanometer. Certain nervous stimuli gave rise to decreased resistance, and thus to the recording of an increased current. Word association analysis was, however, simpler. Freud believed that in hysteria the painful ideas formed a split in consciousness. In hypnosis the same thing took place. In many hysterical cases suggestion played an important part at the time of the psychical trauma. He gave instances of this. A girl, at the onset of the hysterical disturbance, had her arm numbed by hanging over the back of the chair. The prominent symptom in this case was a paralysis of the arm. He was of opinion that for hysteria psycho-analysis was a more powerful therapeutic agent than suggestion or hypnotism could possibly be. He doubted, however, whether these cases could be treated with complete success by psychic methods alone without the assistance of rest, forced feeding, etc., which was the ordinary mode of dealing with neurasthenia.

Dr. Maurice Craig regarded Freud's method as extremely exhausting. In some cases the analysis had occupied two, three, or even four years. Something that was easier and more practicable was required. The difficulty lay in the fact that we did not understand the mind as we understood the body. In dealing with psychasthenia and neurasthenia he came to the conclusion that when the patient was intelligent and well educated the troubles were not so difficult to analyse. Here the field of the association of ideas was open, and it was consequently easier to discover the complexes which were submerged. It was necessary to bring into consciousness one idea, and all the others might be awakened. Turning to the effect of mental troubles on the normal functions of the body, he said that evidence of this could be adduced with ease. One of the difficulties which presented itself was the disinclination of persons to speak about their mental processes. They did not mind talking about defective bodily processes, but were ashamed of a mental symptom. In giving evidence in a recent case he had been asked whether a person could have a feeling of being drawn towards a train which was approaching, and whether the feeling of falling off a height could occur, or of cutting one's throat during the process of shaving without any real disturbance of the mind. He had answered the two first questions in the affirmative when they were put as personal questions to himself, while he succeeded in getting out of the last difficulty by stating that he always used a safety razor. Criticizing the "word-association" table which Dr. Campbell Thomson had exhibited, he came to the conclusion that it would be possible to determine the suicidal tendencies without going through the trouble of this form of analysis. He next dealt with the significance of memory pains of former illnesses. In all these cases the association could be determined, but the necessary factor was to understand the symptom, and if the patient was told how it had arisen it would often disappear. It was highly important to deal with disturbances of mental association, and to study each case with minute care. A large proportion of cases of insanity were the results of neglected disturbances of this kind. In treating them, auto-suggestion came into play in almost all the methods. Here the most important factor was the absolute belief in the physician. One of the reasons why the cancer curer did so well at first was that, having secured this absolute belief, he was able to remove all the associated nervous symptoms. Dr. Craig said that we were only just beginning to recognize the importance of teaching psychology and of studying it in properly-equipped psychological laboratories. In conclusion, he stated that if the physician could get the patient to understand himself he would never see him again.

Dr. Edridge-Green asked Dr. Wingfield for the details of his method of hypnotizing. He then referred to the question of the subconscious mind. He had examined a number of phenomena supposed to be subconsciously performed, but had been able to show that in every case there was always some link with conscious cerebration. There was, in his opinion, always a reflex below the mind which brought about the action. In giving some examples of what he meant, he referred to the recalling of a forgotten name. In one case the name was suddenly remembered, apparently without any outside stimulus, but on minuter consideration it was found that a picture of the individual in a complex group photograph had been the stimulus which assisted in the remembrance. He would like to know what the real difference was between suggestion and hypnosis—where the line of demarcation lay.

Dr. FORD ANDERSON also wished to know where suggestion ceased and hypnotism began. He called attention to the peculiar influence which a lecturer at times held over his audience. It had been reported that a powerful speaker had so carried his listeners with him when speaking on "the idle rich," that ladies had plucked out the feathers from their hats and cast off their fur coats under the influence of the lecture. In this case there were all the conditions said to be favourable for hypnotism—a dull religious light, quiet, absorbed attention on every word uttered by the lecturer, and so on. Was that suggestion or hypnotism? He also inquired whether Freud's method was suggestion or hypnotism. Freud had himself described how he held the patient's head, or laid his hand on one or other part of the body. He knew that Freud objected to the idea that he employed hypnotism; in any case he feared his methods were too ponderous for general use. Dr. Ford Anderson then spoke of a condition or symptom-complex which was common in ladies belonging to the upper middle class. This was due to what he termed "the servant trouble." He had become familiar with the symptoms, and could often tax his patients with having this trouble without receiving a confession from them. Unfortunately the tracing of the cause did not carry with it a removal of the trouble.

Dr. MACINTOSH asked whether Dr. Campbell Thomson could explain the nature of Christian Science.

In reply, Dr. CAMPBELL THOMSON stated to Dr. Wingfield that when he spoke of the subconscious mind he had no intention of imposing a limitation of it to the examples quoted. He merely gave simple instances of subconscious action, and was of the opinion that its limits could not at present be stated. In reply to Dr. Maurice Craig, his table of word-association analysis was merely a simple instance. It was no doubt easy to determine suicidal tendencies by other means, but his intention had been merely to illustrate Jung's method. He had no knowledge of Christian Science.

Dr. WINGFIELD sought to reply to the inquiries as to the line of demarcation between hypnotism and suggestion. He regarded hypnosis as an artificially increased suggestibility. He insisted on the fact that suggestion could be carried out only when the subject's mind had been placed in a peculiar condition.

A cordial vote of thanks was passed by acclamation to Drs. Campbell Thomson, Wingfield, and Maurice Craig.

Reports of Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF SURGERY.

Tuesday, November 8th, 1910.

MR. WARRINGTON HAWARD, President, in the Chair.

Fractures near Joints.

MR. ROBERT JONES opened a discussion on this subject, in the course of which he said that modern advances in general surgery had so engrossed the attention of the most able surgeons that there had been a tendency to leave the treatment of fractures too much in the background. Whether they entirely agreed with him or not they owed much to Mr. Arbuthnot Lane for rousing fresh interest in this subject, and must all feel that his strenuous work had been productive of much good. Every practitioner was expected to treat fractures, but there was a tendency in medical schools to teach students to rely too much on *x*-ray appearances, the correct interpretation of which required a long and careful education. *X* rays should be a court of appeal, after an attempt at diagnosis had been made, and should not be allowed to deprive the student of his powers of clinical observation. "There should not be two schools—one relying on operative and the other on mechanical methods of treatment. Each surgeon should decide for himself whether in a particular case an operation should be performed or not, and the way in which a successful result would be achieved would depend largely upon his special ability." From the patient's point of view, impairment of function was a much more serious deformity than any mere outward change of shape. He was still learning certain fundamental rules for clinical guidance from his mistakes and sometimes from those of others. For instance, Wolff's law must not be forgotten—that the internal structure of bone and its outward appearance were adapted to the strain to which it was subjected and the function it performed and varied to meet changes in strain and function. Hence, in dealing with fractures about joints, the mechanical function of the joint, and the directions of the normal lines of strain across the joint must be clearly appreciated. Again, common deformities and disabilities which were associated with so-called neglected fractures should be carefully studied, so that they might be anticipated and avoided. In fractures about the shoulder they were deficient abduction and rotation, in the hip limitation in the range of internal rotation, abduction, and extension. The elbow-joint was liable to become fixed at an angle of about 130 degrees. At the knee genu valgum and sometimes flexion were the common features of an imperfect result. Thirdly, in case some unavoidable impairment of function was to be feared, they should know which particular movement or which position of the joint it was most important to preserve, and direct the treatment accordingly. As an illustration of this point they might consider fracture of the scaphoid in the wrist, which could be diagnosed from a sprain by the presence of tenderness on slight pressure in the anatomist's snuffbox. The result of injudicious passive movement or of permitting free movement of the wrist was a displacement of the fragments, which prevented dorsiflexion of the wrist. It was a familiar fact that the grasp of the hand was greatly weakened unless the wrist be dorsiflexed. The injury should therefore be treated in the dorsiflexed position. If a fragment of bone prevented the hand from being put in this position it should at once be excised. Mere aesthetic considerations of appearance should be subordinate to questions of restoration of function. Thus, an endeavour should be made to secure a right of way clear of obstructions by bone and callus so that the movements of the joint were not impeded; and the alignment of bones should be preserved so that the lines of stress should fall in a normal direction across the joint. In the lower limb this was of great importance, for deviation of the body weight would produce a cross strain at the seat of fracture, and changes would take place in the bone to meet the altered strains; and these changes were identical with those of traumatic osteo-arthritis. Inflexible fixation by wire or plate, fixation by splints, or no fixation might be simply good or bad, according as the surgeon had or lacked the necessary knowledge and skill to employ them to advantage. In fracture of the neck of the humerus with dislocation of the head the manœuvre he had found most successful was to have the arm extended vertically upwards while the surgeon tried to manipulate the head into position. If reduction by manipulation failed, an operation should be performed in a recent case. It was interesting to note the free range of movement, with good rotation inwards and fair abduction, which often occurred in neglected cases in spite of great deformity. In referring to fractures in the neighbourhood of the elbow joint, he advised treatment of such injuries with the elbow fully flexed, with the single exception of fracture of the olecranon, which was treated with the elbow extended, and should be wired or screwed if the fracture was transverse and the fragments separated. The treatment of a case of supracondylar fracture of the humerus might be taken to illustrate the harmful effects of early passive movements. Patients were constantly being sent to him with practically the same history that passive movements were commenced a week after the accident, and had been carried out assiduously several times a day ever since, and yet a stiff elbow was the result. The practitioner was surprised when he was told that all the joint required was rest in the fully flexed position, and the stiffness would disappear. No passive movement should be commenced until repair was so far advanced that no disturbance of the union would be produced. Each movement (in the case of the elbow, supination, pronation, flexion, and partial extension) should be performed once, and once only; the wrist was then slung up, keeping the elbow flexed for one, two, or three days to allow any damage done to the elbow to heal, and then each movement was again made only once. Repeated

early passive movements disturbed the union, promoted exudation, and the formation of excessive fibrous adhesions and excess of callus. Massage was beneficial at all stages, and must be clearly distinguished from passive movement. On the other hand, active movements free from pain were beneficial. Thus, in the case of the elbow, after three weeks' treatment with the wrist slung close under the chin, the sling was loosened, allowing the wrist to drop three inches. The patient was then encouraged to practise moving the hand from this position back to the mouth. If at the end of three days the elbow was getting stiff in the new position, it must again be fully flexed and rested for a further period. If, however, movement of the hand back to the mouth was free, the wrist might be further dropped, and the further range of active movement practised. Since this systematic line of treatment had been adopted injuries of the elbow had ceased to give trouble. In connexion with the hip, an interesting injury was strain and fracture of the epiphysis and neck of the femur in adolescents, which were precursors of traumatic coxa vara. Three stages might be recognized. First, a boy playing football strained his hip and left the field. The surgeon found no shortening; extension, flexion, and adduction were free, but rotation was painful, and abduction beyond a short range was not tolerated. After some days' idleness the boy went back to the playing field, and soon the same thing occurred again, and games were stopped for the rest of the term. One day something gave way in the hip, and he was helped to bed, and now on measurement there was a shortening of the affected limb by about three-quarters of an inch, and this was due to separation of the epiphysis. In a second case the injury was more severe, the disability was more pronounced, from the beginning there was shortening of half an inch or more, and they knew that they had to deal with a separation of the epiphysis or a fracture of the neck. In a third type there was a strain of the hip, and the boy was incommoded, scarcely disabled, for a day or two. As the weeks passed he complained of lameness and increasing stiffness of the hip. His symptoms seemed to indicate early hip disease. There was limitation of all movements, and the trochanter was above Nélaton's line. The *x*-ray photograph showed coxa vara of the epiphysial type. He had torn the periosteum and strained his epiphysis. All these injuries led to traumatic coxa vara, the characteristic features of which in neglected cases were an adducted stiff hip with some flexion. The treatment should be adopted at once, and consisted of fixation in the abducted position, with strong extension to bring the displaced head or fractured neck into its true relation to the shaft. This might be carried out in plaster-of-Paris, or, as was done in Liverpool, in a modified Thomas's frame. In impacted fracture of the neck in old people his practice was to disimpact the fracture in all cases where there was any outward rotation or shortening, and then treat the case in the same abduction frame. After a few weeks the patient was put in a Thomas's knee-splint with extension. A fortnight later the patient would get up, and walk in a Thomas's caliper splint. If there was any fear of hypostatic pneumonia the patient was treated from the beginning in a Thomas's knee-splint with extension, and was allowed to sit up if necessary. In all these splints the pelvis, lower limb, and splint formed one rigid system, and there was very little movement at the seat of fracture when the patient was moved, and there were no starting pains when the patient fell asleep, such as occurred in cases treated by weight and pulley. Fractures of the condyles of the femur were treated in a Thomas's knee-splint with extension with the knee straight. *X*-ray photographs showed that the lower fragment was often in front of the upper, and not always behind, as one would infer from the classical description. The use of the double inclined plane to neutralize the action of the gastrocnemii was based on a theory which was not found to be true in practice. The procedure in femoral osteotomy was suggestive in this connexion. In the many thousands of these operations performed, how few surgeons had ever resorted to the use of the double inclined plane! Energetic traction to overcome the contraction of the quadriceps and hamstrings was the secret of success. "The spasm of muscle in any part of the body is very transient, and readily yields to pressure and extension." Two conditions were essential to success: (1) Freedom should be secured for movements of the knee, and (2) there must be correct alignment of the hip, knee, and ankle joints. The same laws held good in fractures about the ankle joint. The great point was to get the line along which the weight of the body was transmitted to the ground correct, and to see that there was nothing blocking the normal movements of the joints. Thus, in Pott's fracture the principal deformities were the well-known dislocation of the astragalus outwards, and the less recognized dislocation backwards. A successful result depended first on complete reduction of these two deformities, but did not end there. No weight should be carried on the ankle before the fifth week, and then the heel of the boot should be raised on the inner side to deviate the body weight to the outer side for about six weeks. If this were not done a considerable number of cases would return to the out-patient department with a valgoid deformity. A fracture, not described in the textbooks, which was frequently the result of a fall from a height on to the foot was a split fracture of the anterior external corner of the lower end of the tibia. The portion split off was always displaced forwards, and if unreduced, blocked the way to full flexion of the ankle and caused pain across the front of the ankle, especially at the end of the stride, when the patient was stepping off the affected foot on to the other. If the ankle could be completely dorsiflexed the deformity was reduced; if this could not be done, the offending fragment should be pinned or wired into position. In old-standing cases it should be removed. In conclusion, Mr. Jones said: "I pay more attention to function than to appearance, consider correct alignment of more importance than meticulous care in reposition of fragments, believe that pain is an indication for physiological rest, and therefore deprecate early forced passive movements. If I prefer methods of manipulation and fixation in some cases where others of my colleagues would prefer an open operation, it is perhaps because for many years an increasing proportion of my work has been the treatment of deformities, whether of traumatic origin or not, and have thereby gained confidence in using powerful but carefully graduated force in cases when another would hesitate to do so. My object has been not so much to discuss various methods of treatment as to expose my own for discussion, and hope that those who follow may do the same for our mutual profit." Mr. Rushton Parker added a further warning against passive movements, and demonstrated the advantages of the flexible metal splints introduced by his friend and teacher, H. O. Thomas. Mr. Warren referred to the importance of correcting the alignment of the bearing surface of an articular end to within $\frac{1}{16}$ in. of the normal. He related some cases of separation of the lower epiphysis of the tibia which had led to deformity and required operative correction. Mr. Whitelocke touched on the question of fractured patella, advocating routine operation and mentioning the increased importance of perfect union in view of the Workmen's Compensation Act.

EDINBURGH OBSTETRICAL SOCIETY.

Wednesday, November 9th, 1910.

Dr. F. W. N. Haultain, President, in the Chair.

The Development of Gynaecology.

Dr. Haultain, in a presidential address, traced from the minutes of the society's meetings the transformation of gynaecology from a medical to a surgical science. In this metamorphosis, Edinburgh had played the most prominent part. Simpson's anaesthesia and Lister's antiseptics had made it possible for Thomas Keith to make ovariotomy safe, and to establish the fundamental principles of hysterectomy. Lawson Tait proved the ready accessibility of the peritoneum to surgical interference, and showed that contamination with pus was not necessarily fatal. In 1840 the first gynaecological specimens—uterine polypi—were shown before the society, and shortly afterwards was exhibited an extrauterine gestation sac removed by Sir J. Y. Simpson. Up to 1878, however, the communications were mainly concerned with obstetrics, and gynaecology was a thing of plugs and douches. During the seventy-one years of the society's existence midwifery had shown comparatively little change. In

spite of the great advances made by the introduction of antiseptics, the addition of the axis-traction rod to the forceps, and the use of hot water in *post-partum* haemorrhage, the statistics of the Registrar-General showed that the death-rate was as high last year as fifty years ago. In spite of the certainty that antiseptics had been highly beneficial in labour, the results had fallen far below expectations. The teaching of gynaecology now constituted a special subject of the final examination for the medical degree. He doubted if it was a step in advance to divorce obstetrics and gynaecology as far as the teachers were concerned. It tended to merge gynaecology in general surgery, and that was a retrograde movement. The President also drew attention to the prevalence of puerperal eclampsia in Scotland. Whereas in Dublin the percentage of these cases was 0.5, with a death-rate of 14, in Edinburgh at the Maternity Hospital the percentage was 3, with a death-rate of 35. The increase in Scotland must be due to the change from a diet mainly farinaceous to one rich in nitrogenous compounds. The onset of eclampsia was best counteracted by educating the women to submit the urine for examination during the later months of pregnancy.

MANCHESTER MEDICAL SOCIETY.

Wednesday, November 2nd, 1910.

Mr. STANMORE BISHOP, President, in the Chair.

Identification of the Spirochaeta pallida.

DR. G. E. LOVEDAY, in a paper on the Indian ink method of demonstrating the spirochaete, said the chancre, which should have had no treatment for two or three days previously, should be washed and dried, and its edge abraded with a sterile instrument. Serum was then squeezed out and a drop mixed with water and Indian ink in equal proportions. After the film had been dried, the *Spirochaeta pallida* appeared white on a brown ground. Any cells present showed up, and served to indicate the size of the spirochaete. The simplicity and reliability of the Indian ink method recommended it. Secretion from a primary sore hardly ever failed to show the spirochaete.

Frontal Sinus Suppuration.

Dr. J. ARNOLD JONES, in a paper on the diagnosis and treatment of acute suppuration in the frontal and maxillary sinuses, pointed out that in these cases periodic attacks of neuralgia (mainly affecting supra- and infra-orbital nerves), as accurate and regular in their periodicity as in malaria, might occur. The main lines of treatment in antrum cases were: (1) Washing out the sinus and puncturing the nasal wall in the inferior meatus with a straight hollow needle; (2) endeavouring to establish drainage through natural ostia by applications of cocaine and adrenalin followed up by menthol inhalations. In frontal sinus cases the same measures should be taken for the establishment of drainage, which, if ineffectual in twelve or twenty-four hours, should be followed by amputation of the anterior end of the middle turbinal. Extranasal operation was rarely necessary in acute cases.

Psycho-Therapeutics.

Dr. J. WALTERS, in a paper on the practice of psychotherapeutics, described a method he had employed in about 200 cases. A state of distraction or very light hypnosis was the best. The chief factor of this state was undoubtedly "preadjustment"—in other words, the patient was placed in the most suitable condition to receive and maintain the suggestions given. This was aided by reinforcement (or inhibition), repetition, and the restfulness of the state itself. Cases were cited proving the efficacy of the method in somnambulism, alcoholism, neurasthenia the obsessions, and insomnia.

LIVERPOOL MEDICAL INSTITUTION.

Thursday, November 8th, 1910.

Dr. T. R. BRADSHAW in the Chair.

THIS was a pathological meeting, the following being among the exhibits:—Dr. HARCOURT: A culture of *Aspergillus niger* growing upon a lemon. It had been isolated from an ear which had been affected for two years; recently the external auditory meatus had been partly filled with pseudo-cholesteatomatous layers interspersed with black material. Dr. GROSSMANN: An *Intraocular melano-sarcoma* of the ciliary region of about six weeks' duration. The eye had received a severe electric shock shortly before illness began. Perhaps this had stimulated the growth of a small dormant tumour. Mr. THELWALL THOMAS: A *Retroperitoneal spindle-celled sarcoma*, weighing 22 lb., removed from a patient who was still living four months after the operation. Drs. LLOYD ROBERTS and MOORE ALEXANDER: A *Carcinoma of the pancreas and liver* from a man aged 23. Drs. BLAIR BELL and ERNEST GLYNN: Microscopic specimens from *Concretions in the ovary* of a patient aged 49. They were of two kinds—some calcareous and others due to coagulated proteins mixed with acid haematin. Both varieties probably arose in connexion with the Graafian follicles. Dr. ERNEST GLYNN: Lantern slides of *Spirochaetes* demonstrated by the "Burri" Indian ink method. He drew attention to the enormous number of *Spirochaeta refringens* sometimes encountered in balanitis. Dr. O. T. WILLIAMS, in a note on the *Estimation of chlorides in urine*, advocated a more routine use of the method in cases of nephritis, so as to save the administration of salt-free diet in cases showing no chloride retention. Drs. STENHOUSE WILLIAMS and NAUSS read a note on the value of *Rabbit leucocytic extracts* in the protection of guinea-pigs from anthrax infection. The leucocytes were prepared according to Pettersson's method, and were inoculated in some cases simultaneously with the infecting organisms, in others at intervals of twenty-four, forty-eight, and seventy-two hours after the inoculation with anthrax. In all cases the extract was found to exert a marked protective influence, many of the guinea-pigs living for prolonged periods, though all the controls were dead within six days. Dr. MOORE ALEXANDER stated that leucocytic extract had been used in the treatment of acute infections in man. The diseases treated included pneumonia with or without empyema, epidemic meningitis, streptococcal endocarditis, etc. In the majority of cases so treated the results had been immediately and strikingly beneficial.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, November 10th, 1910.

Mr. GUSTAVUS HARTRIDGE, Vice-President, in the Chair.

Clinical Meeting.

THE following were among the exhibits:—Mr. GEORGE COATS: A case and series of slides illustrating *Atypical coloboma* of the iris and lens with persistent mesoblastic strand. The case, he contended, favoured the theory of Hess, that coloboma of the lens was due to fibrous strands of that sort. There were also changes in the vitreous, retina, and choroid. In the upper part of the eye there were certain areas of choroidal atrophy, although there was no persistent mesoblast. If found alone, they would be taken for patches of old choroiditis, thus illustrating the difficulty which often arose in differentiating between a congenital abnormality and a patch of inflammation. That difficulty had given rise to the idea that true coloboma did not occur in the macula; whereas Mr. Coats thought it did. The changes in the fundus exactly followed the retinal vessels. Another interesting point was in connexion with the development of zonula; he favoured the mesoblastic origin. The cases upon which he based his remarks were mostly cases of aniridia. Mr. W. H. JESSOP: A case of recurrent *Melanotic sarcoma* of the conjunctiva, which was shown before the society seven years ago. At that date the tumour, but not the eye, was removed, and proved to be melanotic sarcoma. There had been recurrences in 1904, 1907, and this year; there had been no pain. Vision was $\frac{6}{9}$, and there was a small swelling under the upper lid. It was removed, with the surrounding conjunctiva, and found again to be melanotic sarcoma. Nothing more was now to be seen except two little patches. Mr. TREACHER COLLINS mentioned three cases of epibulbar sarcoma which he had removed without taking away the eye. There had been no recurrence; one of them dated back twenty years. This

was not a melanotic growth, but a definite sarcoma. Mr. Brewerton believed that in Mr. Jessop's case the outlook was now less hopeful, and that a general metastasis was setting in which would kill the patient. Something more should now be done to the conjunctiva, and the brown pigment patches should be excised. Mr. J. H. Tomlinson: A simple projecting *Polariscope* for use in testing colour perception, and illustrated it with a patient whose illumination perception was normal, but colour vision abnormal.

WEST LONDON MEDICO-CHIURGICAL SOCIETY.

Friday, November 4th, 1910.

Dr. P. S. Abraham, President, in the Chair.

Clinical Evening.

The following were among the cases shown: Dr. F. S. Palmer: (1) A case of *Progressive muscular dystrophy* of pseudo-hypertrophic type in a boy aged 6. No history could be obtained of nervous or mental disease in the family or its collateral branches. The boy had whooping-cough when aged 4, and since then had developed the typical features of his disease. (2) A case of *Myasthenia gravis* in a man aged 41, with marked wasting of the facial muscles. Dr. Arthur Saunders: A case of *Diabetes* in a boy aged 5. No family history of glycosuria was obtainable. He had passed over 2,000 grains of sugar in a day, but under dietetic treatment all sugar had now disappeared from the urine. Dr. Reginald Morton: Skiagrams of a case of *Congenital syphilitic disease* of elbow joint. In one taken before treatment no bony outline could be detected at the site of the joint; in the second skiagram, taken after four months' treatment, the bony outlines of the joint were clearly defined. Mr. N. Bishop Harman: A case of early *Conical cornea* in a woman aged 28. The evidence in this case showed that the condition had remained stationary for several years under treatment. Dr. T. Grainger Stewart: A case of *Exophthalmic goitre and syringomyelia* in a typist, aged 20. The chief point of interest was the involvement of the seventh cervical segment on the left side and its escape on the right.

ASSOCIATION OF REGISTERED MEDICAL WOMEN.

Tuesday, November 1st, 1910.

Mrs. Dickinson Berry in the chair.

Medical Women in India.

Miss Benson, in a paper on the position of medical women in India, said that in Bombay they were trained at the Grant Medical College and took at the Bombay University the qualification of L.M. and S., which was registrable in the United Kingdom. Their training was administered by officers of the Indian Medical Service, the clinical work being done at a hospital containing 500 beds. Women and men students were on an equal footing, and the class from which the students were drawn was good. English textbooks were used throughout, and many students were ambitious to study in the United Kingdom. The resident appointments were permanent, their occupants being hospital assistants, a class of man not fully qualified. On this account it was difficult for the fully-trained doctors to obtain experience before starting practice independently. There was a regular Government service for men, but not for women, and their position was ill-defined and insecure, and needed radical change. In many of the hospitals nurses were trained, and the people had no means of distinguishing between fraudulent and properly-qualified "lady doctors." In this way there was much abuse of the position, especially in the country districts. There were also great difficulties for the native qualified women, as the country was not ripe for young native women to live an independent life. The Government should form a service, of superior and inferior grades, for women, selected by a body on which women had a voice. Such service should be subjected to inspection and supervision by medical women.

Reviews.

DIETETICS.

The Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India constitute a series of important papers, mostly the outcome of original research, by officers of the Indian Medical Service. The thirty-seventh of the series, recently published, concerns *Investigations on Bengal Jail Dietaries*,[1] carried out at the instance of the Sanitary Commissioner with the Government of India in the physiological laboratory of the Calcutta Medical College, by the Professor of Physiology, Captain D. McCay, M.B., B.Ch., I.M.S., and his demonstrators. The subject is handled in a very scientific and exhaustive manner, and the detailed inquiries and the conclusions deduced from them are not only serviceable for the purpose of indicating the best gaol dietaries for different classes of prisoners in the Province of Bengal, but are also of value as contributions to the solution of important physiological problems. A short sketch is given of previous work by Lyon, Lewis and others. Stress is laid on the futility of determining dietaries on a purely chemical basis, or in accordance with European standards, without taking into account racial habits and peculiarities, questions of geography, climate and work, the nutritive value of various articles of diet in different parts and among different races in India, the questions of bulk as regards food, and weight as regards person, and the proportion of essential constituents actually assimilated and used for vital purposes under various conditions dietetic and personal. These and other questions were made the subject of rigid investigation and carefully-conducted trial. Foods and excreta were scrupulously analysed, and selected groups of prisoners of different races in several gaols situated in different parts of the Province were segregated and observed with a view to the determination of the most economical and useful dietary under ordinary and extraordinary gaol conditions. The general conclusions arrived at point to a reduction of bulk, and improvement of quality, digestibility, and assimilability of food, an important recommendation being the larger use of animal food, especially fish. Apart from the special object for which these researches were made, this treatise in conjunction with a previous publication by the same author on the *Standards of the Constituents of the Urine and Blood and the Bearing of the Metabolism of Bengalis on the Problems of Nutrition* (No. 34 of the same series), is an excellent piece of scientific work on dietetics, digestion, assimilation, and metabolism.

TUBERCULOSIS.

The recently published volume of *Studies from the Saranac Laboratory for the Study of Tuberculosis*[2] commences with a long article by Dr. Baldwin on hypersusceptibility or anaphylaxis. He finds from his experiments that a true anaphylactic sensitization can be produced in guinea-pigs by the pure protein substance of the tubercle bacillus extracted by water at 50° C. A single injection of tubercle-protein equal to 0.0008 gram of dry weight is sufficient to sensitize a normal guinea-pig. In another interesting article Dr. Baldwin discusses the fate of human tubercle bacilli when inoculated into bovines. He states that virulent cultures grown directly from human sputum may cause active infection in bovines when inoculated intravenously, and that the disease, though generaliy localized and retrogressive, is a sufficient danger to preclude such methods of immunization for cattle. It is also possible for the disease thus produced, after remaining latent for a time, to be awakened into activity owing to parturition, lactation, or trauma. Human tubercle bacilli do not appear to change their characteristics readily when introduced into the bodies of cattle, as Dr. Baldwin

[1] *Investigations on Bengal Jail Dietaries.* With some observations of the influence of dietary on the physical development of the people of Bengal. By Captain D. McCay, M.B., B.Ch., B.A.O., I.M.S., Professor of Physiology, Medical College, Calcutta. Calcutta: Superintendent of Government Printing, India. Pp. 226, quarto, with plates. (Price, Rs. 2.6, or 4s. 3d.) Agents in England, Messrs. W. Thacker and Co., 2, Creed Lane, London, E.C., etc.

[2] *Studies from the Saranac Laboratory for the Study of Tuberculosis.* E. L. Trudeau, Director. 1904-10. Publication Office of the *Journal of Medical Research*, Boston, Mass., U.S.A.

finds that after nineteen months' residence in bovine tissues a culture of human type has retained its original distinctive properties without modification. Reporting on the use of antiformin, Dr. Paterson finds that this substance is useful for cultivating tubercle bacilli direct from sputum, and also for the examination of faeces, urinary sediment, pus, or blood, when such material is suspected of containing tubercle bacilli.

THE STORY OF OUR LIVES FROM YEAR TO YEAR.

IT is no new idea to describe the span of human existence as a clock, every movement of whose pendulum subtracts a fractional portion from the life of each one of us. Sir WILLIAM ROBERTSON NICOLL, therefore, has chosen a very appropriate title for his book, *The Round of the Clock*,[3] in which he describes

> the story of our lives from year to year as indicated on the clock. I begin at six o'clock in the morning and take every hour marked by the hour-hand as five years. Each year would thus correspond with a minute marked by the minute-hand. In this way life is divided into lustrums or periods of five years. I propose to indicate the character of each lustrum, and to give from biography and other sources characteristics of each year.

These elaborate calculations have resulted in a very interesting and instructive volume, where each lustrum in the life of the average man is dealt with in a separate chapter which contains a full description of the mental and physical characteristics peculiar to each period. These characteristics are illustrated by examples drawn from the lives of famous men and women belonging to every nation, and to every phase of the world's history. The interest of the book undoubtedly lies in these extracts from the lives of those who have gone before us, but it is considerably enhanced by the theories advanced by its author. For instance, Sir William Nicoll regards

> The zenith of success—the time of most consideration and public honour—as somewhere in the Sixties, say from Sixty-five to Seventy. At that time a man may be in full vigour, and yet be able to look back on a laborious and successful career. He is safe, or comparatively safe, in the position he has climbed to. Criticism dies down, people accept him as an institution. Honours are conferred on him partly because he deserves them, and partly because it is felt that there should be no more postponement. All this is, I think, particularly true of the three great professions.

This is consoling to those among us whose way of life is fallen into the sere, the yellow leaf; but the author's disbelief in the alleged increase in the length of human life at the present day brings less comfort. After careful study and frequent consultation he has been forced, he says, to the conclusion that the average life of the modern man, if indeed it has been lengthened at all, has been prolonged only a very little, in spite of the progress in hygiene and sanitation, and this small increase is due rather to "a diminution of the fatalities of the weak than an addition to the vitality of the strong." This, in Sir William's opinion, is most probably caused by the strain of modern existence, a strain which did not exist a generation or two ago, and which nullifies the good effects produced by the advance of science and the improved conditions under which we now live. Though many of his readers may question the truth of Sir William Robertson Nicoll's theories, there can be no doubt that *The Round of the Clock* well repays a careful study of its contents. Its author, in the introduction, tells us that "such as it is, it has cost me much labour," and it is easy to see that infinite pains have been bestowed upon the compilation of this imposing array of facts and figures. *The Round of the Clock* is well printed and bound, and prettily illustrated by George Morrow.

FICTION: NEW AND OLD.

THOUGH the scene of Mr. EDEN PHILLPOTTS'S new book is laid on Dartmoor, *The Flint Heart*[4] in every other respect is quite unlike the usual run of his books, being nothing more or less than a very amusing fairy tale. The plot turns upon the mischief wrought by a flint charm in the form of a heart made by a "mystery man" in the Stone Age, and endowed with the power of making the heart of its possessor as hard and pitiless as its own flinty substance. After having enabled a prehistoric man to establish himself as chief of his tribe by means of bloodshed and cruelty, the charm lies hidden for thousands of years in Phutt's grave, until acidentally dug up by Billy Jago, a Devonshire farmer, and the rest of the book consists of the trouble caused by this unlucky find, not only in the farmer's own family, but throughout the animal kingdom on Dartmoor, and even in Fairyland itself, until the spell is broken by the innocent courage of Jago's little son and daughter. The story is told with all Mr. Phillpotts's accustomed humour, and though there is but little scope here for the peculiar gifts of its talented author, the book is full of touches well worthy of the creator of *The Human Boy*. The literary fairy, De Quincy, grieving over the decline of English prose, is extremely funny; so is the delightful Marsh Galloper, a mischievous little goblin who speaks broad Devonshire, and whose mission in life is "to get you humans into a mess in these here bogs." He alone should do much to ensure the success of the book, but in any case *The Flint Heart* is certain to be popular with children, even with those who consider themselves too old to enjoy fairy tales. The volume is well printed, and prettily illustrated by Charles J. Folkard.

"Certain books hold their own by individual right and might," says Mrs. RITCHIE in her delightful introduction to the latest edition of Miss MITFORD'S *Our Village*,[5] recently issued by Macmillan and Co., and "they are part of everybody's life as a matter of course. They are not always read, but they tacitly take their place among us." Such a book is *Our Village*, which contains some of the sweetest descriptions of English rural life and scenery in the language, and which is full of an old-world charm and fragrance bestowed upon it by its author's passionate love of Nature and humanity. It is remarkable that the charming "Village Sketches" which captivated London some ninety years ago, and which appear to be brimming over with the joy of life and the love of all created things, should have been written by the daughter of a spendthrift doctor, whose pen was the sole means of repairing the havoc made in the family fortunes by her brilliant, but erratic, father. This new edition of a most popular classic is well worthy of the genius of the gentle woman who loved the quiet English countryside so well. The chief feature of it is, of course, the illustrations, and no greater compliments can be paid them than to say that they are worthy of the text. Besides Mr. Alfred Rawlings's beautiful water colours (which seem almost too daintily pretty to be shut up within the covers of a book) nearly every second page has one of Hugh Thomson's delightful sketches, which form a pictorial comment on Miss Mitford's graceful prose. It only remains to add that the value of this handsome volume is considerably enhanced by the interesting preface written by Thackeray's accomplished daughter.

"My friend who wrote the story of the water baby was a very kind man and very clever," Huxley once wrote to his little grandson; and all who know and love Kingsley's fascinating fairy tale will cordially agree with the famous scientist. A new and very handsome edition of *The Water Babies*[6] has just been published by Macmillan and Co., and one cannot help thinking that this beautiful volume and its still more beautiful pictures would have given pleasure not only to the appreciative Huxley and his inquiring grandchild, but to the author himself. The book is well bound and printed, and Mr. Warwick Goble's exquisite coloured illustrations are beyond all praise.

The many admirers of Dan and Una, in *Puck of Pook's Hill*, will welcome their reappearance in Mr. Kipling's

[3] *The Round of the Clock*. "The Story of our Lives from Year to Year." By W. Robertson Nicoll. Illustrated by George Morrow. Published by Hodder and Stoughton, London. 1910. (Pp. 324.)

[4] *The Flint Heart*. A fairy story by Eden Phillpotts. With sixteen illustrations by Charles J. Folkard. London: Smith, Elder and Co. 1910. (P. 310.).

[5] *Our Village*. By Mary Russell Mitford. With an introduction by Anne Thackeray Ritchie; 100 illustrations by Hugh Thomson, and 16 coloured plates from drawings by Alfred Rawlings. Published by Macmillan and Co., Ltd., St Martin's Street, London. 1910. (Pp. 256.)

[6] *The Water Babies*. A Fairy Tale for a Land Baby. By Charles Kingsley. With illustrations in colour by Warwick Goble. London: Macmillan and Co., Limited. 1910. (Pp. 274.)

latest book, *Rewards and Fairies*,[7] which is intended as a sequel to the former, and every child who reads the fascinating tales contained in this volume must envy the brother and sister whom Puck has honoured by his friendship, and to whom he gives such wonderful glimpses into the past. Mr. Kipling is, perhaps, almost at his best when writing either of children or of the pleasant county he loves so well, and he has drawn a delightful picture of two entirely delightful children in their home in the heart of the Sussex Weald. *Rewards and Fairies* consists, like its predecessor, of a collection of historical sketches of different periods; but in the second part its author goes farther afield, and does not confine his attention solely to the history of his own country. Both in "Brother Square-Toes" and its continuation, "A Priest in Spite of Himself," the scene is laid in France and America during the years immediately following the Revolution, and Washington, Talleyrand, and even the great Bonaparte himself, play a part in the development of the story, which, by the way, is somewhat unnecessarily involved and obscure. The majority of the stories, however, concern Sussex, and of these, perhaps, the best is "Marklake Witches," a pathetic little tale of the Napoleonic wars, which has for its heroine the consumptive daughter of a Sussex squire, whom two enlightened men, a French prisoner of war and an old sailor and whilom smuggler, endeavour to cure by modern methods, with the result that they are nearly murdered as witches for their pains. The story, told by the dying girl herself, all unconscious of the doom hanging over her, is skilfully handled and written with infinite tenderness and restraint; the ending, in particular, is quite perfect. Incidentally, "Marklake Witches" contains a clever thumb-nail sketch of Wellington, long before the days of his dukedom, describing the battle of Assaye "as though it had been a whist-party—I suppose because a lady was present." Another story whose plot turns upon modern scientific discoveries is "A Doctor of Medicine," in which a physician checks an outbreak of plague in a country village during the Civil War by exterminating the rats with which the whole place is swarming. Culpeper is an amusing example of a seventeenth-century physician—self-satisfied and long-winded—who stumbles by accident upon the discovery which enables him to save the stricken people, and who attributes the epidemic to the constant warfare waged between the moon and her enemy, the planet Mars. Space forbids further enumeration of the many good things with which the book abounds, but two of its stories deserve special attention. One is "The Tree of Justice," in which an old acquaintance, the Norman Knight. Sir Richard Dalyngridge, gives the true version of Saxon Harold's end—his escape from the shambles of Senlac and his return years later as an old half-witted pilgrim to die at the feet of the King who was reigning over England in his stead; and the other, the charming "Conversion of St. Wilfred." The latter contains a beautiful little sketch of the saintly Archbishop of York and his friend Meon, a fine old heathen who will not curry favour with the new God by deserting the gods of his fathers, and who refuses to become a Christian unless his pet seal, Padda, is baptized with him. Padda (the name is a stroke of genius) is delightful, and so is Eddi, the Archbishop's chaplain and devoted companion, who is incapable of seeing a joke, and who firmly believes that poor Padda is in league with the powers of darkness. Mr. Kipling is to be congratulated upon *Rewards and Fairies*, which has succeeded, where so many sequels fail, in fully coming up to the standard of the volume which preceded it. As in *Puck of Pook's Hill*, the author has managed to create something of the proper atmosphere for his tales, whether they deal with Saxon England, the Syone Age, or the "spacious times of great Elizabeth." Moreover, he has told them, for the most part, simply and clearly, with little of the obscurity and straining after effect which has spoilt so much of his later work; and the lessons they teach of the beauty and necessity of an unselfish patriotism and duty to the mother country are none the less effective for being carefully concealed behind a mask of fiction. The book is well bound and printed, and contains some pretty illustrations by Frank Craig.

[7] *Rewards and Fairies*. By Rudyard Kipling. With illustrations by Frank Craig. Published by Macmillan and Co., St. Martin's Street, London. 1910. Pp. 338.

Mrs. Molesworth is so universally and so deservedly popular that anything from her clever pen can always be counted upon to receive a warm welcome from her youthful admirers. Her latest book, *The Story of a Year*,[8] though perhaps it may not quite come up to the high standard of its predecessors, is by no means unworthy of the author of those charming stories, *Carrots*, and *Us*. The story of the trials endured by little Fulvia Derwent and her young mother at the hands of a miserly old relative under whose care they had been placed, is told very simply and prettily by the child herself; and there is a really charming picture of two maiden ladies who keep a tiny shop in an old-world suburb, and under whose roof the mother and child are driven to take refuge. The book, of course, ends happily, with the return of the husband and father from a long journey to the West Indies; but not until his wife and daughter have gone through some curious experiences, both pleasant and unpleasant. There is never anything of a violently exciting or unusual nature in Mrs. Molesworth's books, but they possess a certain quiet charm that is peculiarly their own. This is probably due to the fact that whilst their author never appears to be writing down to her little readers (a thing which children are quick to discover and resent) she never forgets for whom she is writing, and becomes, as it were, almost as if she herself were a child again, with all a child's quaint fancies, and the narrow outlook on life and love of detail which is so marked a characteristic of childhood. But besides this, Mrs. Molesworth possesses a decided gift for character drawing, and is particularly happy in the portrayal of a certain type of old-fashioned child, dreamy and imaginative. Fulvia Derwent is but one more addition to that large family of delightful little girls whose joys and sorrows have entertained more than one generation of childish readers, and she is fully as charming as any of her older sisters. Altogether, *The Story of a Year*, which is prettily bound, and illustrated by Miss Gertrude Demain Hammond, can be safely recommended as an ideal Christmas or New Year's present to any little girl.

[8] *The Story of a Year*. By Mrs. Molesworth. With illustrations by Gertrude Demain Hammond. London: Macmillan and Co., Limited. 1910. (Pp. 232.)

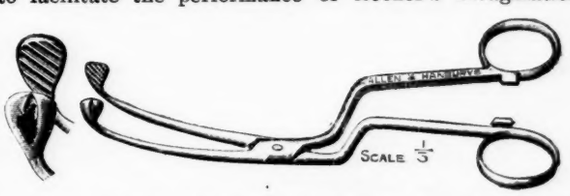
NOTES ON BOOKS.

We have received a copy of Professor Karl Pearson's presidential address delivered at the annual meeting of the Social and Political Education League.[9] The address is an admirably clear and forcible exposition of Professor Pearson's well-known views and contains in addition some interesting reminiscences of his early work as a popular lecturer and the knowledge he obtained therefrom. The pamphlet will repay perusal by Professor Pearson's many friends and not less numerous opponents.

[9] *Nature and Nurture: The Problem of the Future*. By Karl Pearson, F.R.S., Eugenics Laboratory Series VI, pp. 31; 2 plates. Price 1s. (London: Dulau and Co. 1910.)

MEDICAL AND SURGICAL APPLIANCES.

Mr. Harry Crichton (Assistant Surgeon, South Shields Infirmary) writes: The accompanying illustration shows a forceps made to my design by Messrs. Allen and Hanburys to facilitate the performance of Kocher's invagination



operation for the radical cure of inguinal hernia. As will be noted, the shaft of the forceps has a gentle curve bringing the head to the level of the handles, and terminating in a "bullet-shaped" head bearing a slot on either side. The head of the forceps, carrying the invaginated "sac," protrudes the parietal peritoneum into the opening made

by separating the fibres of the internal oblique and transversalis muscles, and here it is secured. Through the buttonhole now made in the peritoneum the sac is very readily picked up by inserting the teeth of a tenaculum forceps into the slots in the head of the hernia forceps. The forceps have proved very satisfactory, and render the performance of this excellent operation very simple, and if working single-handed or on a muscular subject, they are invaluable.

EXTERMINATION OF RATS.

OFFICIAL CIRCULAR.

THE Local Government Board has issued the following circular to port sanitary authorities, town clerks, and clerks to urban and rural district councils:

Local Government Board.
Whitehall, S.W.,
November 12th, 1910.

Sir,

I am directed by the Local Government Board to advert to their Circular Letter of the 10th instant, and to forward to the Sanitary Authority the enclosed copies of a Memorandum which has been prepared by the Board's Medical Officer on the subject of Plague, together with Directions for obtaining and forwarding for bacteriological examination material from suspected Plague cases.

A copy of the Memorandum and of the Directions should be given to the medical officer of health, and a copy of the Memorandum to the inspector of nuisances.

I am to request that the Sanitary Authority will instruct their officers to use their best endeavours to secure the carrying into effect of the suggestions which the Memorandum contains.

The Memorandum will be placed on sale, so that copies may shortly be obtained either directly or through any bookseller from Messrs. Wyman and Sons, Limited, Fetter Lane, E.C.

I am, Sir,
Your obedient Servant,
H. C. MONRO,
Secretary.

MEMORANDUM ON PLAGUE.

I. GENERAL CHARACTERISTICS OF THE DISEASE.

After frequent recurrences during several centuries, ending with the great outbreak of plague in 1664–1679, the disease disappeared from Great Britain for more than 200 years. In 1894 it became prevalent at Hong Kong, and since that time it has spread from Asia into various parts of Europe, America, Africa, and Australia. In 1900 and in two subsequent years small outbreaks have occurred at Glasgow, and one or more cases have also occurred at Liverpool, Cardiff, and Leith during the last ten years.

During the present year (1910) cases suspected to be pneumonic plague were associated in Suffolk with definite occurrence of plague in rats and other rodents.

In view of these facts sanitary authorities and their officers should be on the alert, and especially should they take steps for ascertaining the cause of any recognized excessive sickness in rats, or of human illness of a doubtful nature associated with sickness or mortality in the same district.

The following facts with regard to plague should be borne in mind:

1. *Symptoms of Plague.*

An attack of plague usually begins some three to five days after exposure to infection. The attack may develop gradually, but, commonly, there is sudden onset with much fever, as indicated by a high temperature, rapid pulse, headache, hot skin, and thirst. The eyes are injected; the expression, at first anxious, becomes subsequently vacant and dull; the utterance is thick, and the gait unsteady as in one under the influence of drink. There is at times a distinct tendency to faint. The tongue is at first covered with a moist white fur except at the edges, which are red, but later on it becomes dry and of a mahogany colour.

The most distinctive sign of plague is the presence of glandular swellings, or "buboes" as they are called, in the groin, armpit, or neck. These "buboes," which led to the disease being called "bubonic plague," appear, as a rule about the second or third day of the disease. They are usually painful and tender on pressure, and in size they vary from that of an almond to that of an orange. Later on they may "gather" and burst like an ordinary abscess. In a few cases "carbuncles" occur.

Cases of plague occur in which buboes are greatly delayed or even absent, as, for instance, in "pneumonic," "gastric," and "septicaemic" plague.

In addition to the above-mentioned forms, plague sometimes takes on the so-called "ambulant" form. In plague of this description the affected person is hardly ill at all, presenting no definite symptoms, perhaps, beyond indolent, though painful, swellings in groin or armpit. Such plague cases may nevertheless be instrumental in spreading the disease, and any persons, therefore, who, having been possibly exposed to plague, exhibit these symptoms, should be isolated and watched medically until the nature of their malady has been definitely ascertained.

2. *Diagnosis of Plague.*

The three most important forms of plague—bubonic, septicaemic, and pneumonic—are very liable to be confused with venereal diseases, enteric or typhus fever, and ordinary pneumonia respectively; and the differentiation will be greatly facilitated (*a*) if the medical practitioner bears the possibility of plague in mind; (*b*) if he inquires carefully into the antecedents of the patient and into the occurrence of rat sickness or mortality; and (*c*) if he avails himself of the bacteriological aid to diagnosis mentioned below. The occurrence at or about the same time or in succession of more than one case of pneumonia in a house, or the unusual prevalence of disease of a dubious character in a neighbourhood, should at once lead to suspicion and to the action needed to clear up the diagnosis.

3. *Method of Spread of Plague.*

The pneumonic form of plague is directly infectious from patient to patient, the expectoration, and possibly also the droplets ejected when the patient coughs, containing plague bacilli. The means for avoiding personal infection are set out below.

In bubonic plague there is a consensus of experience that personal infection rarely, if ever, occurs; and that, given elementary cleanliness, including absence of fleas and bugs, little risk is run by doctors or nurses or other attendants. Bubonic plague is the rule, pneumonic plague is rare. That infection from patient to patient seldom occurs is further shown by the comparative infrequency of multiple cases of plague in invaded houses. Experimental observations[1] have shown that the plague bacillus has only a short extra-corporeal vitality; and that infected soil and dust need not be considered as serious or continuing sources of infection.

It has also been shown that experimental feeding of animals with virulent plague material produces the disease only when the infective material is given in enormous doses. Apart from the protection afforded by cooking, such massive infection of human food is highly improbable. It is, however, desirable that the access of rats and mice to human food should be prevented.

In the majority of cases of human plague the virus enters through the skin by means of a flea-bite, occasionally by inoculation in other ways. Under experimental conditions the chance of infection varies with the number of infected fleas which are allowed to bite the subject of the observation. The risk of infection, therefore, may be regarded as likely to be proportional to the extent to which the house or workplace is infested by plague-infected fleas.

4. *Rats the Source of Plague.*

Plague for administrative purposes may be regarded as a disease of rats which incidentally and occasionally attacks man. Fleas form the intermediaries between the diseased rat and man. If the fleas of infected rats (or the fleas of such other animals as occasionally suffer from plague) are excluded from access to human beings, plague will seldom, if ever, spread from animals to man.

The species of rat and the species of fleas infesting the rat have an important bearing on the likelihood of infection spreading to man.

During the great epidemic of plague in England in the seventeenth century, the black rat (*Mus rattus*) was chiefly prevalent. The brown or Norwegian rat (*Mus decumanus*) began to invade England early in the eighteenth century, and soon almost entirely replaced its smaller and weaker rival in this country. The change bears on the possibility of the occurrence of human plague in this country. The brown rat in towns is found chiefly in sewers, docks, slaughter-houses, granaries, etc. In the country it lives in burrows in the hedgerows and ditches and in ricks. It is a shy animal and avoids man, seldom taking up its abode in human habitations. In India the black rat lives and breeds in the houses and huts of the natives, in close proximity to man. Both the flea *Ceratophyllus fasciatus*, which commonly infests rats in this country, and *Pulex cheopis*, which is the usual rat flea

[1] See Reports on Plague Investigations in India, in *Journal of Hygiene*, particularly vol. viii, No. 2 (1908).

in India and other tropical countries, readily feed upon man when hungry and when their natural host is not available; *Pulex cheopis* is usually considered to bite man more readily than the former.

II. Measures against Plague.

The chief measures requiring to be taken to prevent the spread of plague follow from the knowledge of its natural history which has been acquired in recent years, especially as the result of the work of the Indian Plague Commission.

Measures concerned with the prevention of importation of infection from abroad are regulated by the International Sanitary Convention of 1903, and need not be considered in this Memorandum.

The experience of Glasgow shows that in this country the disease in man can easily be controlled under conditions of efficient sanitary administration.

The measures to be taken in respect of plague occurring in this country concern (*a*) human source of infection, (*b*) infection from inanimate objects, and (*c*) infection from lower animals, especially the rat.

(*a*) *Precautions against Human Infection.*

The first step in the control of spread of infection from patient to patient is the discovery of suspected cases of illness, and their prompt notification to the medical officer of health.

Notification.—The Board's Order of September, 1900, requires under penalty immediate notification to the medical officer of health of the district, and by him to the Board, of every recognized case of plague. To aid in this recognition the sketch of the clinical features of the malady given above has been inserted in this memorandum. Further, in order to aid in identifying plague newly developing in a district, the Board have arranged for

Bacteriological diagnosis, without cost to the local authority, of material sent to the Board's medical officer by the medical officer of health from the earliest suspected cases.

Isolation and Observation of "Contacts."—Although it is only in the pneumonic form of disease that personal infection is likely to occur, the isolation of all patients suffering from plague is desirable, among other reasons, because disinfection and the disinfestation of premises from vermin can be more efficiently secured after the patient's removal. It is important to keep under observation those who have been in contact with the patient or exposed to the same conditions.

The Production of Personal Immunity.—Those persons who are liable to be exposed to direct infection will do well also to protect themselves beforehand by means of the plague prophylactic, which has been found to be successful in India in protecting attendants and others exposed to infection under very dangerous conditions. Plague prophylactic should be obtained by the medical officers of health of districts actually invaded by plague, for the protection of doctors and nurses who may have to attend cases of plague, or others who may be exposed to infection. Any person attending a patient with recognised or suspected pneumonic plague should use strict precautions to avoid infection. Among such precautions may be mentioned personal cleanliness, especially of the hands, and the use of a respirator containing a film of cotton, made to cover the nose and mouth.

The part played by man in spreading bubonic plague is small. Hence measures taken against him have a correspondingly limited influence in preventing the propagation of plague. In the case of pneumonic plague direct personal infection occurs. Such outbreaks are successfully dealt with by isolation of the patients and observation of contacts.

(*b*) *Precautions in Regard to Inanimate Objects.*

These are concerned with the destruction of infective material derived from man or from animals, and with removing the harbourage for rats.

As already stated, the plague bacillus does not live long outside the animal body, even in excreta or in discharges from the lungs and abscesses. It is, however, important thoroughly to disinfect and cleanse infected dwellings. The disinfection and cleansing which will be most efficient will be such as will secure the disinfestation of the rooms and of all articles of bedding and clothing from fleas. Clothing, which may harbour infected fleas, is dangerous. Fleas are to be found in dust and rubbish in dirty, untidy houses; hence the importance of domestic cleanliness in the prevention of plague.

The removal of all heaps of refuse, especially of garbage affording food for rats, the removal of empty boxes or any rubbish allowing rats to hide near houses, the stopping up of rat-runs with broken glass and tar, the repairing or relaying of drains in houses where there are rat-runs, are among the most important methods for preventing the spread of plague by the rat. It is also important securely to stop up entrance to spaces under floors of dwellings and outbuildings where rats may harbour.[2] These and other like measures, which will occur to all, are directed towards *preventing the access of rats to or their entrance into houses.* If rats are kept out of dwellings, danger is relatively small. There is difference of opinion as to the keeping of cats. Cats which have worried plague infected vermin may bring rat-fleas into the house; but the presence of a cat in a house is one of the best safeguards against domestic invasion by rats or mice. The balance of evidence appears to be strongly in favour of the protective influence of cats. But a cat which shows signs of illness should be destroyed and buried.

Domestic uncleanliness favours plague. The human flea (*Pulex irritans*) which flourishes under such conditions, will bite both the rat and man; but it is seldom found on rats and soon dies out on them. Uncleanliness also may lead to increase of rats in and about the house.

(*c*) *Precautions against Rats.*

The *continuous* suppression or limitation of rats in a district into which rat plague has been introduced will prevent the occurrence of human plague of local origin. Efforts should, therefore, be concentrated in such districts towards this end. Complete extermination of rats is, perhaps, impossible; but decrease of rats, short of extermination, diminishes greatly the chances of infection. Such measures must be persistent, as the rat soon breeds up to its old level of numbers, conditioned only by the amount of food supply and the activity of its enemies. Rats are intelligent, and will migrate to other districts unless the efforts at destruction are combined and systematic. In view of likely migration, medical officers of health and inspectors of nuisances, as well as private persons, in districts bordering on a neighbourhood where rat-plague exists, should make inquiries at intervals, and submit suspected rats found dead or ill for bacteriological examination.

There are several methods of dealing with rats, but it is unwise to trust to any one of them alone, and, when practicable, all methods should be employed together. Of traps, a spring trap has been found to be the most useful kind. Poisons containing phosphorus or arsenic are effective, but they should not be laid where poultry or other domestic animals may be poisoned. The different forms of bacterial virus are useful, where chemical poisons cannot safely be employed. They are said sometimes to be uncertain in result, and it is important that animals poisoned by them should not obtain access to human food. Hunting with dogs and ferrets is a very effective method, especially in the hands of expert rat catchers. If dogs or ferrets are employed, they should be kept under observation and not allowed in domestic dwellings. The Board of Agriculture and Fisheries are about to issue a leaflet on the subject of rat destruction, which will contain general information on the matter.

Even in districts not affected with rat plague, nor bordering on districts so affected, the sanitary authority should be on the watch for the occurrence of unusual mortality among rats. If excessive mortality is observed, bacteriological examination of rats found dead should be made, and if they prove to have died of plague, steps should be taken to ensure the *systematic and continuous destruction of rats.* Precautionary measures of this kind are especially called for in and about docks and wharves, and also in places where rats abound, such as granaries, meat markets, slaughter-houses, piggeries, and dumping grounds for refuse. The private slaughter-houses still found in the immediate neighbourhood of dwelling-houses are a special source of danger, being commonly over-run with rats.

Fleas leave the dead rat when it becomes cold. Dead rats should, however, not be handled without precautions. Cremation is the best method of disposal of dead rats, if it can be carried out without involving delay or unguarded handling. Failing this they should be so buried that they cannot be disinterred by other animals.

Rat catchers, as well as those engaged in disinfection of clothing, etc., can, apart from the administration of plague prophylactic, partially protect themselves by the external application of powders, etc., disliked by fleas, and by wearing puttees or gaiters and gloves.

On a previous page the importance of removing all harbourage for rats in or near houses has been emphasized.

[2] The provision of a layer of concrete under the floor, as required in the Board's Model By-laws for new buildings in urban districts, is of importance in this connexion.

So far as possible every house should be rat-proof. It is equally important not to encourage the domestic invasion of rats by allowing morsels of food to lie on or under the floor or in ashpits.

The most important recommendations may be summarized as follows:

1. Persistently and systematically destroy all rats.
2. Remove and obliterate their nests, burrows, and habitual haunts, and
3. Make each dwelling as far as practicable rat-proof, and remove all known harbourage for rats in or near dwellings.
4. At the same time do not allow waste food (whether for human beings, chickens, or other animals) to accumulate in or about the house.

Rat plague is not necessarily accompanied or followed by human plague. Freedom from risk of plague can be secured, with almost complete certainty, by any household which acts in accordance with the directions given above.

ARTHUR NEWSHOLME,
Medical Officer.

Local Government Board,
November, 1910.

BACTERIOLOGICAL EXAMINATION IN SUSPECTED CASES.

Dr. Newsholme has issued the following directions for obtaining and forwarding for bacteriological examination material from suspected plague cases.

[The Local Government Board, with a view to assisting in the identification of plague newly developing in a district, have arranged for bacteriological testing, without cost to the local authority, of material from the earliest suspected case or cases, or from the earliest suspected rodents, in the district. *This material can be received only from the Medical Officer of Health.*]

A.—*From the Living Person.*

1. Clean with soap and water and then with alcohol the skin over the bubo. When dry, or after mopping with a clean cloth, pierce the bubo with the needle of a hypodermic syringe (previously cleaned with boiling water); empty the syringe into a small phial, previously cleaned with boiling water. Collect additional exuding fluid in capillary tubes.
2. When there is a discharging bubo, collect fluid therefrom in capillary tubes, as in the above case. When this discharge is not of a sufficiently fluid character for collection in this way, place some of it in a small glass-stoppered phial, previously well washed out with boiling water or with alcohol, care being taken that no alcohol remains in the phial.
3. If expectoration be obtainable, collect some in a phial in the manner prescribed in the previous sentence.
4. If the patient shows symptoms of lung disease, it should be considered whether fluid may not be obtained by aspiration under strict aseptic precautions from the lung over the affected part, and collected as above.

B.—*From the Dead Body.*

1. Cut out any inflamed lymph gland, together with some of its surrounding tissue, wrap the whole in fresh gutta-percha paper, and place it in a wide-mouthed glass-stoppered bottle, previously well washed out with alcohol, care being taken that no alcohol remains in the bottle. The bottle should have the stopper well secured and sealed.
2. Obtain also a piece of the spleen, dealing with it in the same manner.

C.—*From Rats and other Rodents.*

The suspected dead animal should be immersed in a solution of a strong disinfectant before being placed in the package. By this means fleas, if any, can be destroyed.

The animal should then be packed in a tin box or a jar with a close-fitting cover, and this placed in a larger wooden box filled in with sawdust.

D.—*Directions for Forwarding Material.*

1. All suspected plague material should be very carefully packed so as to avoid risk of breakage and danger of infection during transmission.
2. The material may be sent by letter post, not parcel post, if the Post Office Regulations[3] are complied with. The postage need not be prepaid.
3. The package should be addressed "The Medical Officer, Local Government Board, Whitehall, London."
4. A statement giving details as to the source of the material, and a preliminary account of the clinical character of the case, and other information respecting the patient should always be sent, under separate cover to the Medical Officer, Local Government Board, at the same time as the material is sent.
5. Where possible the Medical Officer, "Localise" London, should be advised by telegram that material has been dispatched, specifying the route and also, if possible, the time when the material may be expected to arrive.

[3] Postal Regulations for sending deleterious liquids or substances by ordinary letter post for medical examination: "Any such liquid or substance must be enclosed in a receptacle hermetically sealed, which receptacle must itself be placed in a strong wooden, leather, or metal case, in such a way that it cannot shift about, and with a sufficient quantity of some absorbent material (such as sawdust or cotton-wool) so packed about the receptacle as absolutely to prevent any possible leakage from the package in the event of damage to the receptacle. The packet so made up must be conspicuously marked 'fragile, with care,' and bear the words 'pathological specimen,' and also the signature and address of the medical practitioner or veterinary surgeon who sends it. The packet must on no account be sent by Parcel Post. Any packet found in the post not packed and marked as directed, will be at once stopped and destroyed with all its wrappings and enclosures."

THE AUTOMOBILE EXHIBITION.

IN our last issue we gave a general account of the constructional tendencies manifested in the 1911 models of motor cars shown at Olympia. In the interval that has elapsed a detailed examination of many of the exhibits has been possible. Before describing them, however, we accentuate for the benefit of our readers abroad what has been said before as to the increasing favour with which detachable wire wheels are being regarded by mentioning that those prejudiced against detachable wheels nevertheless need not deprive themselves of the advantage of wheels made of material which will not alter materially at different temperatures. Some ordinary but all-steel wheels made by Sankey are now procurable, and appear to have given satisfaction both in India and Australia.

A Novel Drive for the Magneto.

A good notion of the increasing extent to which accessibility and simplicity are being studied may be gained from the 8-h.p. single cylinder De Dion car. In this the natural circulation of the water is relied on for cooling purposes, and a positive and direct drive is afforded to the magneto machine, as it is driven direct from the forward end of the crank shaft, being centrally situated, yet readily dismountable. There has also been a modification in the design of the De Dion clutches for all types. The plate member is faced with a series of leather segments. Allowance is made for any creeping to which the leather may be subject in the course of wear by spacing these segments to a sufficient degree. In the popular single-cylinder model, wherein the cylinder diameter has been reduced though the motor is to the full as powerful as any previous ones, there is no exterior fly-wheel, this detail being enclosed in the base chamber. This obviates any necessity to carry additional weight in the clutch, which is accordingly an extraordinarily light member that does not run in oil, though it is enclosed around the spring. The details of these new clutches would certainly repay inspection. The springs are now made longer than formerly, and a special form of triangular radius rod is employed in connexion with the live axle. Natural circulation is also relied on for cooling the 9-h.p. two-cylinder type and the new 12-h.p. four-cylinder model. The latter is a development from the 10-h.p. model of last year, but has a piston displacement 20 millimetres longer; it is, indeed, a very long-stroke engine, since the cylinder bore is only 66 millimetres and the piston travel is 120 millimetres.

Darracq Novelties.

The Darracq firm has made a considerable change in its programme this year, the smallest model being a 10-h.p. machine with a pressed steel frame, and the lower portion of the seats in two single pieces or sheets of metal joined centrally; Messrs. Darracq, of course, was the first firm to standardize the use of the now universal pressed steel side parts to car frames. The firm also brings forward a medium-powered six-cylinder model, but the chief feature of interest is to be found in its four-cylinder 15-h.p. type, which succeeds the 14-h.p. model of last season, but departs from it in several details, apart altogether from having a motor of larger dimensions. For one thing, the cylinders are not cast at one operation but in pairs, and for another the crank shaft is now equipped with ball bearings. Many firms are taking up this practice, for instance, Messrs. Delahaye on a small machine and—in another style of motor—the Daimler firm with a 12 h.-p. monobloc sleeve-valve engine. The 15-h.p. Darracq motor has overhead valves and tappets, while another novelty is that the entering portion of the clutch is pressed out of one piece of steel.

New Style Adler Valves.

There is quite an interesting novelty in the Adler programme concerning the largest of its new cars, which is a nominal 20-h.p. four-cylinder machine, having the inlet valves set above the exhaust series. These valves are of large area and are so designed that the lift of them is made comparatively slight, the better to ensure silence and precision. All the valves are on the left side of the motor, the inlet series being set immediately above the exhaust ones. The tappets are worked by rods that move in long guides between the valve chambers. Each inlet valve is set in a sleeve dropped into the pocket proper and is worked by a rocking tappet carried in a stanchion forming part of the valve sleeves. Then, again, the number of distributing gear wheels has been reduced to two, thus making still more for efficiency and quietude. The magneto machine and the pump for circulating the cooling water are driven by a common transverse shaft in front of the engine.

A Recruit for the Worm Drive.

The chief item in the Argyll programme is the introduction of a 12-h.p. four-cylinder model that embodies several departures from the previous practice of the firm. These include the employment of front wheel brakes and the use of a worm drive in combination with a very ingenious shaping of the transverse frame member to provide against all risk of displacement of propeller shaft and the car jumping that shaft, pole fashion. The Argyll system is the very simple one of slightly sinking the second rearmost transverse frame member so that it sweeps a few inches below the truly horizontal propeller shaft terminating in the worm placed over the master wheel in the rear live axle. In this connexion it may be noted that, as a general practice, makers are using overhead worm drives in the case of cars of 12-h.p. or less and an under-drive in others, consequently setting the motor, clutch, gear box, and the transmission gear on the slope to achieve a straight drive with absence of work for the universal joints. The Lanchester, Daimler, Wolseley, Sunbeam, Napier, Thornycroft, and a number of other firms employ this latter mode, by far the majority of them having the engine on the slope. The Argyll chassis in general is a very much stronger as well as a more efficient model than anything the firm has produced previously. Among the bodies built for it is one specially well suited for some classes of medical work—a smart two seated body with scuttle dash, high sides, collapsible occasional seat at the rear, and a very low, racy type of cape cart hood that fits close on to the low wind screen.

The New Armstrong-Whitworth Machine.

The Armstrong-Whitworth programme this year is enlarged by the addition of a 17.9-h.p. four-cylinder model which, like the Argyll, has all four cylinders cast in one operation. It is a rapidly growing practice for low and medium powered engines, initiated by Mr. Edmund Lewis, who also pioneered the movement of enclosing the valves in readily detachable cover plates—a plan which achieves a much cleaner engine, as well as makes for an additional degree of silence. In the Armstrong-Whitworth machine a honeycomb cooler and a fly-wheel fan are furnished in combination with reliance on natural circulation of water, while the carburettor itself is set unusually high, so as to enhance accessibility. With the carburettor thus placed, a stream of appreciable depth could be forded without fear of water getting into the cylinders. It may also be noted that the pressure feed for the petrol is derived from a small air pump worked off the lay shaft in the gear box, which furnished four speeds forward, the through drive representing the top speed. The plate clutch is coupled up rigidly to the gear box, and the steering column, as well as the steering pivots, are equipped with ball-thrust bearings, the column itself being adjustable to about 30 degrees.

Long-stroke High-speed Engines.

It is some time since there has been embodied any outwardly obvious change in the constructional details of the Clément-Talbot machines. This year, however, the first thing one notices is that the valves are set all on one side, Indian file fashion, so that they are worked by a single cam shaft, thus reducing the amount of half-time gear employed, and making for additional silence; moreover, the piston travels have been made longer in relation to the cylinder diameters. In the early days long-stroke engines suffered from comparative coarseness and slow speed, but the compression now employed, and that increased knowledge of metals which has enabled reciprocating parts to be greatly lightened, have resulted in getting very high speed motors that are not coarse in use, and which naturally develop extraordinary power in relation to their size and the number of their revolutions. The new style 15-h.p. chassis really gives the key to the fresh Talbot practice in all the models, which include a very attractive 20-h.p. six-cylinder model. The lower ends of the connecting rods delve into troughs for their splash lubrication, while oil is forced by a pump to the main engine bearings. The cooler is mounted on felt pads with springs to the holding bolts, and there is a flexible connexion between the leather clutch of the four-speed gear box, while all the road wheels run on combination load and thrust ball bearings. The latter are also fitted to the top and bottom of the steering column, and the steering heads are provided with phosphor bronze bearing rings. There is a hand adjustment for taking up the foot brakes, and the manner in which the radius rods are made long so that their points of anchorage may coincide with the universal joint on the front end of the propeller shaft is worthy of note.

Humbers.

The Humber firm makes a fresh start in the motor industry by bringing forward three quite new models which, while retaining those features that have rendered Humber cars distinctive in appearance, are in actual constructional practice as well as in material quite an advance on everything that has yet come from the firm. The new feature of all the engines is the employment of silent chains to work the cam shafts, just as they are used by the Daimler and Minerva Companies in connexion with the valve shaft of the sleeve valve engines. It is a practice which seems to be growing, since it is employed this year by Germain to work overhead tappet valves. In the 28 h.p., which is the largest of the Humber trio, the magneto machine as well as the valves are worked by these silent chains. Other details worth study are the ample brake surfaces furnished, the strength of the steering connexions, and, in the case of two smaller models, the tubular member that encloses the propeller shaft, and also, in the largest type, the pressed steel "V" style torque member.

Worm-driven Sunbeams.

The Sunbeam Company comes forward at the conclusion of the most prosperous season in its history with a series of three models, all of them employing the worm form of live axle drive from below the master wheel. The largest model is a six-cylinder nominal 18 to 22-h.p. machine; it is similar in design to the 12 to 16-h.p. four-cylinder type, the casting being done in pairs of cylinders with the inlet and exhaust valves on opposite sides. The front ends of the three-quarter elliptic springs used at the rear are anchored so that there is no call to use radius rods, nor is a torque member employed. The six-cylinder model has engine dimensions of the same size as the smaller four-cylinder model; but the grouping is done in threes, after the manner approved by Rolls-Royce, Vauxhall, Delaunay-Belleville, and the rest. The way in which the steering-gear of the Sunbeam machine is fixed is out of the ordinary, while details of minor refinement that call for note in connexion with these cars are that a laminated spring-drive is employed in connexion with the magneto machine, while not only is the carburettor hot water-jacketed, but there are also three cross tubes that pass right through the induction pipe, and through which the warm liquid circulates.

New Gear-box Oiling.

The Wolseley Company's programme for 1911 is very varied, the largest model being the 50-h.p. six-cylinder type supplied to Queen Alexandra, and the smallest the nominal 12-h.p. model. In connexion with the former there is a mechanical novelty in the construction of the gear box which is significant, and which may be expected to be widely imitated. Instead of the gears churning in a bath of oil the lubrication system is practically the same as that adopted for some engines—that is to say, a well is

cast in the lower part of the gear box. From this a pump draws the filtered oil and forces it along a pipe set parallel with and above the gear shaft, and having holes corresponding with the positions of the various spur wheels, on to which the lubricant accordingly falls. This is a very much neater and more refined method of working, the oil being supplied precisely where it is needed. It will be noted, too, that the Wolseley Company is increasing its use of the worm drive, and employing higher compressions and higher engine speeds; that is to say, the motors take their load at a much greater number of revolutions, so that, size for size, the 1911 Wolseley types are more powerful and flexible than the corresponding ones of the current year.

Sleeve-valve Rovers.

The Rover Company makes a notable departure in supplementing its series of poppet-valve models by two popular types fitted with the new Daimler-Knight silent sleeve-valve engines. They are the first to be put on the market by any firm with one and with two cylinder units, so that, from the engineering point of view alone, it is an interesting development. The single cylinder vehicle is rated at 8-h.p. The 12-h.p. two-cylinder model is the same in engine dimensions as the nominal 22-h.p. four-cylinder Daimler engine. In both the sleeve-valve models an overhead form of worm-drive is employed, and the larger one has the supplementary coil rear springs used on the Daimler cars, as well as a very original form of anchorage to the forward end of the enclosed propeller shaft. The chassis are strong throughout, yet they are not weighty.

"V"-set Two-cylinder Vehicles.

The two-seated nominal 10-h.p. Riley cars may be regarded as a development rather from cycle practice than from big-car practice. They are light vehicles, and there is a larger model rated at 12 to 18 horse power. Detachable wire wheels of larger diameter are now employed, but the "V" engine with the two cylinders set at right angles the one to the other is retained, and the firm's special form of gearing—one which renders it possible to change without the gears clashing—remains a standard feature. A single-blade distributor is employed, while another feature in connexion with the carburation is that the rich mixture is taken from the jet chamber through a diluting chamber.

The Napier Programme.

The chief feature of the Napier programme is the 15-h.p. four-cylinder car; but the firm's 1911 practice does not seem to embody anything mechanically fresh, for, though a point is made of the new gate change and gear box, this latter resembles one employed by Bell Brothers for their cars for some years. The notion is admirable, for while it leaves the lay shaft idle when the through drive is in service, it ensures that when any intermediate speed is required, the spur wheel to be brought into mesh shall be already turning at the correct ratio of speed for engagement. As to the control, it is impossible for the reverse speed to be put in while the sprag is in service. The firm still fits the worm drive at option to these models. They may be taken as examples of the many medium-powered, reasonable priced, four-cylinder refined cars that the best makers now place on the market.

A Piston Valve Machine.

There is simplicity as well as originality in the construction of the engines employed on the Crowdy cars. When introduced last year they evoked considerable interest, and again attracted attention this year. The engine differs both from sliding sleeve-valve and poppet-valve engines, in having the admission and exit of the combustion mixture regulated by miniature cylinders driven at half the speed of the power cylinders. This creates a great difference between these engines and spring-controlled valve motors, for no matter what the motor speed may be, the working of the valves must precisely synchronize with the speed of the crank-shaft; for these miniature pistons move up and down, closing or uncovering ports in a positive fashion, instead of the return action depending on the strength of a spring. In the chassis of the Crowdy car the power is conveyed to a master wheel on the live axle by a worm drive from below, and a special point kept in view has been to make all parts accessible and removable rapidly without general disturbance of the machinery.

The Metallurgique.

The makers of Metallurgique cars, exhibited by Messrs. Warwick and Wright, have seen little need to alter them in mechanical detail; certain of their features are already distinctive; for instance, the spring drive on the front of the propeller shaft. Nevertheless in its 1911 models the firm is employing larger valves with correspondingly increased engine power. The net result is that the 14, 20 and 26 h.p. four-cylinder models are deemed sufficiently powerful for all purposes. Consequently the larger types will be supplied in future to special order only. Otherwise, the chief feature of the exhibits on this stand was the luxurious character of the body work by Van den Plas and the ingenuity of the fittings. An equal degree of luxury is sought probably by few medical men, but these bodies are nevertheless worth examination as illustrating what a great deal can be achieved by attention to fine details.

Coachwork and Accessories.

We have already drawn attention to some characteristics of the coachwork this year, and mentioned some bodies of a kind suitable for medical use, but must draw attention to the double-purpose cabriolet body which Messrs. De Dion are now building. It is excellently designed throughout, and presents that ease of access to the driving-seat from either side, which is now being secured in all the bodies built by this firm. Another form of body not unlikely to prove popular among men is that which Messrs. Cann of Camden Town have registered under the name of "Medicann"; while Messrs. Alford and Adler of Newington Butts showed a further novelty in the form of a kind of limousine, which, in general arrangement, conforms to what are known as Sedan-chair vehicles, but has in addition a sliding roof. Now that bodies are being built flush and with doors both to front and rear seats, there is a point to which purchasers should pay special attention. They should see that all doors not only lock into parts of the body, but also that they are hinged to one or other of its integral parts. If, for instance, a door is fixed to a dashboard, rattling is bound to set up sooner or later. Moreover, the fact that when closed carriages are made convertible into open vehicles by dropping windows into the doors and the use of collapsible pillows, weight is necessarily increased, is a point of some importance if the car is usually to be used open and not shut. As for the great tyre makers, such as Messrs. Dunlop, who now hold a warrant as tyre makers to the King, and the Continental Tyre Company, they seem less disposed to bring out new designs than to perfect those which are already of proved value. Nevertheless, the Continental Tyre Company supplemented its range this year by chrome leather, steel-studded, non-slipping treads, with small circular discs under the rivets to prevent their being pressed through the treads. It may be mentioned, too, that the Challenge Reinforced Inner Tube manufacturers have figured excellently in some official tests carried out by the Royal Automobile Club. As for carburettors, which count for so much in automobile work, the number of makers who are now using the carburettors of White and Poppe, and the motors of the same firm, seems now very large. Some minor improvements have been introduced into the carburettor, and we understand that at a recent trial a motor fitted with this carburettor developed 24-h.p. on the brake with a consumption of only 0.65 petrol per horse power per hour. Before concluding, examples may well be given of recent additions to the list of high class firms which are now catering for professional users of cars. Cases in point are Messrs. Austin, with a four-cylinder 10-h.p. car; Messrs. Deasy, with a 12 h.p. worm driven car; Messrs. Daimler, with a 12-h.p. sleeve valve car; and the Mercedes manufacturers with a 10 to 15 four-cylinder poppet valve car.

A SPECIAL effort is being made by the Surgeon-General of the United States Navy to provide for the protection of gun-pointers and other enlisted men whose duties require keen eyesight. The illumination of fire rooms, dynamo rooms, and living spaces generally will be the subjects of special study, and recommendations will be made for the improvement of conditions. The eye conditions of men detailed to adjust carbons on searchlights will be safeguarded in the future by special goggles or screens to cut off the actinic rays.

MEDICAL WOMEN AND THE SUFFRAGE.

A memorial in support of the Conciliation Committee's bill for woman suffrage was sent to the Prime Minister on November 14th. The memorial is a follows:—

"*November 14th*, 1910.

"To the Right Hon. H. H. Asquith, P.C., M.P.

"Sir,—We the undersigned Medical Practitioners desire to urge the Government to grant immediate facilities for the further stages of the Conciliation Committee's Bill for Woman Suffrage.

"In a Memorial which 531 medical women had the honour to present to you in November, 1908, their unanimity on the question of Woman Suffrage was clearly shown.

"As members of the medical profession women conform to all regulations imposed upon candidates for medical degrees and they undertake responsible public and private work which is fully recognized by the State. It is manifestly inexpedient that, on the ground of sex alone, they should be unable to influence legislation on questions about which their special knowlege particularly fits them to hold an opinion.

"Moreover, as taxpayers, women practitioners feel strongly that their exclusion from all voice in the election of Parliamentary representation is inconsistent with the first principles of democracy—namely, that Government rests on the consent of the governed, and that those who pay the taxes should have a voice as to how the taxes are spent.

"The justice of the claim made by women for the Parliamentary vote has been admitted by large majorities in the House of Commons on many occasions.

"We urge that the dignity of the House of Commons will be diminished if it fails to put its principles into practice. We ask that time may be given to allow the present House of Commons to carry through the final stages of the Conciliation Bill, which has already passed its Second Reading by a majority of 110 votes, and which proposes to extend the Parliamentary Franchise to those women who are already on the municipal register.

"We remain, yours faithfully."

It is signed by Mrs. Scharlieb, Mrs. Garrett Anderson, Miss Aldrich Blake, and 404 other medical women.

LITERARY NOTES.

The second number of *The Child* has just appeared, and amply fulfils the expectations aroused by its predecessor. There can be no doubt that this most attractive magazine has a future before it; and in the meantime it is doing an extremely useful work which cannot fail to have a salutary effect upon the moral and physical development of the children both of the present and of coming generations. The contents of the November number are so many and so varied that it is somewhat difficult to pick and choose amongst them; but mention should be made of a very interesting description of "Oxycephaly," by Dr. W. A. Potts, and another, equally interesting, of "Mongolianism," by Dr. Murray Bligh; whilst a long article on "Fear and the Evolution of the Child," by Dr. H. Macnaughton-Jones, is worthy of special attention from all those who are called upon to look after nervous or backward children. Other items of interest in this month's number are Miss M. H. Mason's "Inspection of Boarded-out Children," a most instructive article on "Respiration in School Children," by J. F. Halls Dally, and a charming account, written by the founder himself in collaboration with H. J. Gauvain, of the life and treatment of crippled children at the Lord Mayor Treloar Cripples' Hospital and College at Alton, in Hampshire. *The Child* is rendered doubly attractive by the addition of some interesting photographs, which are reproduced in its pages.

A very interesting series of articles by Dr. M. A. Van Audel of Gorinchen have appeared in the July, September, and October number of *Janus* on Dutch superstitions and folklore. From these we learn that a great many of the popular beliefs current in Holland to-day are of very ancient date, and moreover are very similar to those found in other countries. For instance, the old saying that children could not be born till the coming in of the tide is in full force amongst the inhabitants along the Dutch coast, and the virtues of a child's caul are still an article of faith, whilst the numerous ways of foretelling the sex of the unborn child which are common amongst Dutch mothers have been in use for many centuries amongst the women of other nations. The idea that if the face of the expectant mother is free from spots she will give birth to a son comes down from the Greeks and Romans, and the belief that the time of the preceding child's birth determined the sex of the coming one is still common in Ireland and the Ardennes, where it is yet believed that a son will be born if his elder brother or sister came to this great stage of fools when the moon was on the increase, and a daughter if it arrived when the moon was on the wane. Another ancient method, still in use amongst the Malays of Sumatra, of settling the sex question, is for the mother, at the commencement of milk secretion, to drop some milk into a little water. If the milk dissolves immediately, she may expect a girl-baby, but if it remains as it is for a little while, she will be delivered of a son. If the child dies before it is weaned, the flow of milk is stopped by laying its little shirt on the mother's breast, a practice still found in Hungary. There are all sorts of ways to cure sore and inflamed nipples. Some take the form of plasters and ointments, such as leaves of a white lily soaked in brandy, lily bulbs which have been standing in oil, or an embrocation made of foenum graecum, a medicine which was well known to the ancients, and is mentioned by Dioscorides and other old writers. There are other and ruder methods, however, which are regarded as equally efficacious, such as the application of hemp drenched in tar, of a newly-worn woollen nightcap of the husband's, a wet dish-cloth, or even a young dog which had been cut open whilst still alive and laid upon the woman's breasts. All sorts of charms and superstitions still prevail in Holland with regard to the cure or prevention of different diseases and disorders. Headache, for example, is cured by the application of a slice of lemon peel, or raw potato, a piece of red cabbage or even of tin-foil to the temples; whilst he who never cuts his nails except upon a Friday hides them in a hole in a hollow tree, carries a cow's tooth in his pocket, a bag of indigo or hempseed in his hat, or a fresh sheep's spleen in his nightcap is considered immune from this distressing complaint. Mistletoe which has grown upon an oak tree, and has been infused in red wine, is a sovereign remedy for apoplexy, convulsions, worms, lameness and epilepsy. The last-named disease is still treated as it was in the Middle Ages, with human blood, elk's claw, crab's eyes, peony root, linden-blossom, rue, and the placenta of a first birth, all of which are likewise used for any kind of fits. Another remedy is for the patient to eat the heart of a mole, a roasted mouse, or to drink the blood of a white duck, whilst eggs, which have been laid on Maundy Thursday and are beaten up with the shell, are efficacious not only in cases of falling sickness but also of cancer. The ancient faith in the Three Kings as protectors against epilepsy is still very strong. Another means of preventing epileptic attacks is never to eat flesh from the head of any animal, whilst in Limburg and Brabant it is quite common to find people wearing the prayer of Charles V as a charm against this disease. This prayer, the original of which was found on the Holy Sepulchre at Jerusalem, is said to have been sent to the Emperor by the Pope as a safeguard in war. The magpie is considered most efficacious not only in cases of epilepsy but also for gout in the joints, madness, melancholia, and diseases of the eye. The latter are likewise cured by the application of saliva (some forty years ago dogs were used to lick diseased eyes, a practice happily gone out), urine, and woman's milk, as well as by different kinds of water, such as March snow-water, dew gathered on Christmas night, and the water from Lourdes and other holy wells. Water from the well of St. Willebrord near Heiloo in North Brabant is especially efficacious when drawn before seven o'clock in the morning, and its healing properties are at their best on Maundy Thursday. Infusions of celandine, chickweed, and speedwell are also largely used for eye troubles. Boiled mouse is regarded as a cure for enuresis; it is mentioned by Pliny, who says, "Urina infantium cohibetur muribus elixis in cibo dates." Another cure for the same complaint is the taking of *Porcellio scaber*, which the ruder Dutchmen vulgularly call "piss-a-bed," in porridge.

British Medical Journal.

SATURDAY, NOVEMBER 19TH, 1910.

PREVENTABLE BLINDNESS.

THE movement in favour of the inclusion of infantile ophthalmia in the schedule of notifiable diseases, and of the making of arrangements by local authorities for its treatment at their expense when need be, may be expected to receive additional impetus from the attention which the Medico-Political Committee has recently suggested that the Divisions should pay to the matter.

Already, however, the movement may be regarded as a success, for the Local Government Board, when acknowledging the receipt of a copy of the Association's report on the subject sent to it by the Council, was able to state that fifty sanitary districts had then adopted notification, including the boroughs of Chester, Chorley, Macclesfield, Manchester, Neath, Norwich, Rotherham, Stoke-on-Trent, St. Helens (Lancashire), and Wimbledon, and that the Board was ready to authorize other local authorities to take the same course whenever they applied.

This was in August last, and since then note has been made in the JOURNAL of sundry additional districts in which the Infectious Disease (Notification) Act of 1889 has been extended to cover ophthalmia neonatorum. A conspicuous as well as a recent case in point is the action of the London County Council in accepting, at its meeting on November 8th, the recommendation that it should make use of the powers granted by the Public Health (London) Act of 1891, and thus make ophthalmia neonatorum a compulsorily notifiable disease within the administrative county of London.

For the initiation of this movement, the value of which comes home to local authorities when they realize the cost of educating blind and seeing children respectively, the British Medical Association may rightly claim most, if not the whole, of the credit. As its precise starting point may perhaps be regarded the decision of the Council in 1906 to select ophthalmia neonatorum as the subject of the next Middlemore prize competition. This set to work a good many active minds among the younger ophthalmologists, and resulted not only in the penning of the essay by which Mr. Sydney Stephenson won the award, but in several other excellent compilations. Specially notable in the present connexion was that which Mr. Bishop Harman subsequently published under the title of *Preventable Blindness*, for it brought out with admirable clearness, not only how high a proportion of all children are blinded at birth, owing to infantile ophthalmia, but the comparative ease with which the operation of that cause could be prevented if suitable administrative measures, such as those generally indicated in the essay, were adopted.

The formal announcement of the award was made at the meeting of the British Medical Association at Exeter in 1907, and on the same occasion a discussion on the subject was initiated in the Section of Ophthalmology by Mr. Simeon Snell, who was at that time President-elect of the Association, and whose death we have since had to deplore. Mr. Snell, on the basis of some elaborate statistics resulting from the investigation by him of the precise cause of the blindness of each of the children in a large school for the blind in his neighbourhood, was able to offer reasons for believing that infantile ophthalmia was as common as at the date, many years ago, when its identity was first realized, and the discussion ended in the Section of Ophthalmology passing, on the suggestion of Mr. Sydney Stephenson, a resolution definitely calling on the Association to take still more active steps in the matter.

The immediate result was the appointment by the Council of a committee representative of the Association, of the Ophthalmological Society, the Incorporated Society of Medical Officers of Health, and of the sections of the Royal Society of Medicine which deal respectively with diseases of children and obstetrics and gynaecology. The co-operation of the Central Midwives Board was also invited. The final outcome was a report which on publication attracted general attention. Undoubtedly a material factor in this result was the interestingly written memorandum by which the report was accompanied, and it no longer need be a secret that this was drawn up by the chairman of the committee, Mr. Sydney Stephenson, who, of course, also took an important part in shaping the definite recommendations with which the report concluded.

Since that time the subject has been constantly brought to the notice of the public in one way and another, so that there is already a considerable degree of general comprehension of its bearings and importance. On this account the suggestion now made to Divisions that they should press the question on the attention of local authorities all over the country is well timed, and as a working scheme has been put forward simultaneously by the committee, action may be expected to be taken in many fresh quarters. This scheme, we understand, is largely based on the experience gained in North Staffordshire by Dr. Reid, the Medical Officer of Health for the County; by Dr. Folker, the medical initiator of the notification movement in the Potteries, the first of all districts to seek additional notification powers; and by the local Divisions of the Association, and by members or representatives of other Staffordshire bodies.

We gave some account of the net outcome of the working of the parent scheme at page 1550 of the JOURNAL of November 12th, in recording the occurrences at a conference of delegates from local authorities, held at Wolverhampton, with a view to deciding whether the North Staffordshire scheme should be adopted by all authorities in the county. The main facts, however, are worth repeating, more especially as they resulted in an affirmative answer being given forthwith to the question indicated.

Some of the principal statements on the subject were made by the chairman of the meeting, the Earl of Lichfield, who carefully dealt with the question before the meeting as if it were purely a business proposition. He showed that the half-dozen districts which had established notification, and had arranged for such notification to be followed up by effective treatment, found that the average cost of each case which came under treatment at any early stage was only about a guinea, and that in relation to population the total expense both of notification and of treat-

ment need not be expected to equal an expenditure of more than 17s. 5d. per 1,000 of population.

The figures given by Mr. E. V. Greatbatch, Chairman of the North Staffordshire Blind and Deaf Institution, who shares with Dr. Folker the honour of securing the first practical trial of the effect of notification of this disease, related to clinical results, and with many people would prove an even more effective lever than financial considerations. He showed that during the time that the disease had been notifiable—relatively quite a short one—as many as 75 cases of infantile ophthalmia had been notified, and that in all but 2 per cent. of these the sight of the children had been saved.

We need not dwell on the saving of relative unhappiness and human suffering implied by these clinical results, but merely point out two lessons which may rightly be drawn from them. They mean that over seventy children who came into the world possessed of the untold blessing of sight were saved from the calamity which threatened them by the working of a very simple and inexpensive administrative machinery, and that it is not only these children and their parents who will benefit. The ratepayers of North Staffordshire will also benefit, for whether a child is stone blind or possesses perfect vision the ratepayers are equally responsible for the cost of its education. On a conservative basis the cost of educating a blind child, and training it in such fashion that when it has reached a certain age it may be capable of gaining its own livelihood, in part or in whole, was placed by Lord Lichfield at £500; while the education of an ordinary child costs only about £30. The difference between the two sums multiplied by the proportion of children saved in North Staffordshire during the course of its experimental adoption of notification and treatment indicates with sufficient accuracy the financial gain which ratepayers as a whole may reasonably expect if notification is introduced and arrangements made for suitable treatment throughout the whole of the country.

THE DRESDEN HYGIENE EXHIBITION.

As has already been announced in the JOURNAL, an International Exhibition of Hygiene is to be held at Dresden in 1911. The exhibition is under the patronage of His Majesty the King of Saxony, and among its honorary presidents are His Excellency the Imperial Chancellor von Bethman-Hollweg and Prince von Bülow. In the list of the various committees are many of the heads of administrative departments and most of the leading hygienists in Germany. The organizers of the exhibition have taken the whole of human life in its hygienic aspects for their province. The scheme extends over all the agencies that may influence health for good or for evil. There are sections devoted to air, light, soil, and water; to town-planning, including dwellings, lighting, ventilation and heating, water supply, cleansing the streets and public places, disposal of the dead; to nutrition and foodstuffs, including the physiology of nourishment, meat supply, milk supply, vegetables and stimulants, and the examination of food; to the clothing and care of the body, including bathing and gymnastics; to diseases of occupation, including the physiology and hygiene of work, industrial poisoning, special industrial hygiene, and care of the working classes; to infective diseases, including microbiology and parasitology, immunity and vaccination, infectious diseases in man and animals, warfare against epidemics, and disinfection; to the care of the sick and the saving of life; to the care of children and adolescents, including school hygiene; to traffic, including streets and railways, ships, and accommodation for travellers; to naval and military hygiene; to tropical hygiene; and to statistics. Special sections have been assigned to tuberculosis, alcoholism, venereal diseases, cancer, and diseases of the teeth. The work of all these sections is mapped out in minutest detail so as to cover the whole field of scientific hygiene and to show its development. The history of hygiene has a department to itself, which is intended to show what enlightened care was bestowed on the problems of public sanitation and on personal health among various peoples even in remote antiquity.

The objects of the exhibition are purely educational; it is intended to make hygienists of all nations acquainted with what is being done in other countries, and to bring home to the public what has been achieved by scientific research for the physical welfare of man, and to impress upon people the truth that health is a necessary condition of the efficiency and the happiness both of the individual and the community. It will be an object-lesson on a vast scale in hygiene, comprising within that term everything that has any bearing, direct or indirect, on the advancement of our knowledge of the means of waging successful warfare against the innumerable dangers to health amidst which we live and move and have our being.

The exhibition will be international in the fullest and widest sense. To ensure this the German Government issued invitations to all the principal nations of the world to take an active part in the realization of a scheme essentially philanthropic in character. Most of them have accepted and voted considerable sums of money for the proper display of what they have done and what they are doing in the field of hygiene. One great country only stands aloof. This, to the shame of our Government be it spoken, is Great Britain, the birthplace and cradle of modern hygiene.

The history of the negotiations is interesting and instructive. First, the Foreign Office sent an official refusal in response to the invitation of the German Government. Efforts were made to induce it to reconsider this decision, and the position of this country as the pioneer in hygienic progress was freely recognized by the organizers of the exhibition, who offered this country the best site at their disposal. The only result of these efforts, however, was that the matter was referred to the Board of Trade. That body pleaded through its chairman, Lord Lytton, that it already had three industrial exhibitions—Brussels, Turin, and Rome—on its hands, and seemed to think that a sufficient reply to the application. In vain it was explained to the Board of Trade that the Dresden Exhibition has in it no element of commercialism, but is purely educational in character; in vain was it pointed out that an International Hygiene Exhibition, in which this country took no part, would be like *Hamlet* with the Prince of Denmark left out; in vain, too, was it urged that the abstention of Great Britain from an exhibition in which it might have been expected to take a leading part would certainly be misconstrued in Germany. The Board of Trade was deaf to all appeals.

That the action of our Government was, as a matter of fact, imputed in Germany to political ill will is

too clear, and the feeling has found expression in more than one German periodical. Only one proof need be given. In a powerful letter which appeared in the *Times* of November 3rd, Lord Ilkeston quoted the following passage from the *National Zeitung*: "A remarkable sidelight has been thrown on the 'friendly feelings' which England entertains for Germany by the recently announced fact that the English Foreign Office has declined to participate officially for England at the International Hygiene Exhibition in Dresden." At a time when it is of such vital importance that friendly relations between the two nations should be carefully fostered, it is deplorable that the British Government should apparently go out of its way to give offence to Germany. We do not believe that its decision has any political character. Its attitude is simply due to lack of insight on the part of the Board of Trade in a matter outside its mental horizon, and especially to the want of appreciation of the value of scientific research which is a distinctive feature of all our Governments, whatever be their political hue. With the possible exception of Spain, there is no civilized country in which science is held in such light esteem, whether by politicians or by the people, as it is in this country. This is often attributed to want of ideas, which was said by Matthew Arnold to be a national characteristic. This is surely a strange charge to be brought against a nation which has furnished the world not only with the seeds of philosophic thought and an incomparable imaginative literature, but with some of the most far-reaching discoveries and inventions in the field of medicine and hygiene, and in science generally. But though we are not destitute of ideas, we fear that the unfortunate action of the Government in regard to the International Hygiene Exhibition will give point to the old gibe that we are a nation of shopkeepers. Can anything more incongruous be imagined than that a question which has nothing to do with commerce, but is wholly scientific and educational in nature, should be referred to the Board of Trade? It might have been thought that the most hide-bound bureaucrat would see that, with cholera knocking at our doors and plague already within our gates, hygiene is as practical a question as trade. We appeal to the Government, even at this eleventh hour, to break the bonds of official routine and allow this country to take the place in the Dresden Exhibition which rightfully belongs to it and which has been so gracefully conceded. In default of this, we earnestly hope that some of our wealthy philanthropists will redeem our country from the reproach which it must otherwise suffer.

WATER FOR WASHING THE MOTOR.

A QUESTION which we thought had been set at rest by a decision in the King's Bench in 1907 has recently been revived by the Metropolitan Water Board. It is, Can the Board make an additional charge upon a medical practitioner in respect of the water which he uses for washing his motor car? It appears that the Board has threatened to demand additional payments from certain members of the profession in London because they make this use of water, but we wholly fail to see what right it has to do so, having regard to the decision above referred to. In that case it appeared that the Harrogate Corporation sought to make a special charge against Dr. Ian Donald Mackay in respect of water used in washing his motor car. Speaking generally, a water authority must supply water for domestic purposes at ordinary rates. The Waterworks Clauses Act, 1868, does not define domestic purposes, but says what is not included in that term. Thus, "A supply of water for domestic purposes shall not include a supply of water for cattle or for horses, or for washing carriages where such horses or carriages are kept for sale or hire by a common carrier, or a supply for any trade, manufacture, or business, or for watering gardens, or for fountains, or for any ornamental purpose." It was argued that, inasmuch as the doctor used his motor for seeing his patients, he used it in his business. It was the washing of something which was part and parcel of the respondent's stock-in-trade. But this view did not prevail. The Lord Chief Justice said: "If it had been intended to hit such a case as the one now before the court it would have been done by putting in some such words as 'or where a carriage is used by a professional man who rides in it.'" Mr. Justice Darling said: "If it had been intended to include in this section a doctor's carriage the Act would have said so plainly." Thus Dr. Mackay established his case, and was excused from liability to pay an extra 10s. a year for this water rate. We should mention, perhaps, that it was decided some years ago that the washing of an ordinary carriage was a domestic purpose within the meaning of the Act. The meaning of "domestic purposes" was also considered in a recent case in relation to the powers of the Metropolitan Water Board itself. A gas company had sanitary conveniences, and the water supplied was solely used by the servants of the company while engaged in their trade or business. It was argued that this was not used for domestic purposes, but the court held that it was. To judge from this case, the true principle appears to be to consider the actual user of the water and not the object for which it is used.

TYPHOID CARRIERS.

IN a report issued by the Local Government Board[1] Dr. J. C. G. Ledingham presents a review of current knowledge about the transmission of typhoid fever by the "carrier." Dealing with the infectivity of carriers he shows that infection has been traced with more or less certainty to such sources in a large number of cases, both in domestic life and in military and other public institutions. In many instances the incriminating evidence is quite conclusive. Milk and other foods are common vehicles of transmission from the carrier, and sometimes the personal relationship between the carrier and the person attacked is sufficiently close to suggest direct personal infection. Several observers have endeavoured to ascertain what share of enteric fever is due to the carrier. Their results differ widely, ranging between 2.3 and 32 per cent. of the total amount of the fever. Some of those who have arrived at a high percentage maintain that such results are due to greater care and more prolonged investigation, and that therefore they are more accurate. Sufficient statistics are not yet available for making a reliable estimate of the number of carriers in any given community; such incomplete data as are forthcoming indicate, as a provisional estimate, that the proportion of carriers in an ordinary population is about 3 or 4 per 1,000. Carriers, it appears, are much more frequent in adult life than in youth, and, as we pointed out last week, they are more commonly females than males. Associated with this latter fact is the greater frequency of gall-stone disease in women. Is it possible to cure the chronic carrier? Dr. Ledingham discusses

[1] *Reports to the Local Government Board on Public Health and Medical Subjects.* (New Series, No. 43.)

this important question in detail, and records many instances in which curative treatment has been attempted by drugs, vaccines, surgical operation, or in other ways. So far the results, on the whole, have been very disappointing. There may, perhaps, be a little more hope of eliminating the bacilli from the urine than of banishing them from the intestinal excreta. With the latter type of carrier, in Dr. Ledingham's opinion, the prospect of success is extremely remote, except, perhaps, when treatment can be adopted in the early stage of the condition. Dr. Ledingham concludes his report with a discussion of the measures which have been tried or proposed with a view to lessening the danger of disseminating typhoid fever by carriers. We must take steps to detect the carrier, and, when we have discovered him, we must endeavour to make him take the precautions which his dangerous condition demands. "There is no doubt that much good has already been accomplished by instructing typhoid carriers in proper methods of disinfection, and it is on the disinfection of the hands that chief stress must be laid." With a view to determining the most efficient and at the same time the least irksome method of cleansing the hands of typhoid carriers Gaehtgens has recently performed an interesting series of experiments. He smeared the hands and fingers with faeces containing typhoid bacilli, and determined the relative disinfectant values of washing, with and without disinfectants, followed or not followed by thorough drying. Washing with soap and water alone, without subsequent drying of the hands, caused a marked fall in the number of *B. coli* and *B. typhosus*, especially of the former. If the hands were dried thoroughly after removal of the soap in running water, subsequent cultivation frequently showed a complete disappearance of both these micro-organisms. For those carriers who are not specially employed in handling food, Dr. Ledingham thinks that the cleansing of the hands with soap and water, followed by drying, affords "a tolerably complete protection." But for carriers engaged in the preparation of food he advises the use of a disinfectant after the ordinary washing and drying process. Gaehtgens, he tells us, found that the most satisfactory germicide for this purpose was alcohol, in the form either of eau de Cologne or of spirits of wine.

ROENTGEN CINEMATOGRAPHY.

THE dramatic effect produced by the reports in the daily press of a demonstration of microscopical cinematography is likely to be short-lived. The movements of science have been considerably accelerated since the end of last century, and nowadays ideas as well as men fly. Years ago a certain Parisian surgeon attracted much attention by exhibiting cinematograph representations of himself operating at lightning speed at congresses and annual meetings. These pictures savoured of advertisement, and were never popular, save as a side show among the less scientifically inclined members of the profession. Cinematograph pictures were, however, utilized by several teachers for the purpose of demonstrating symptoms and other phenomena to a large class. For a long time no further advance was made in this direction. At the Annual Meeting of the Association this year a form of cinematograph was shown in the Medical Museum, by means of which nystagmus could be watched, and a second machine was intended to teach deaf-mutes the movements of the lips in speaking. These machines, however, could only be utilized by a few persons at the same time. Now comes the introduction of moving microscopical pictures, in which protozoa and bacteria are seen gaily indulging in their morning or afternoon walks. This is outdone by the introduction of Roentgen cinematography. We learn that an engineer named Alfred Wertheimer[1] had the opportunity of demonstrating to the Göttingen Medical Society the first films taken by a machine called the Polyphos. The movements of respiration, the peristalsis of the stomach, and so on, were the subjects chosen. It appears that Dr. Kästle, Professor Rieder, and Dr. (Phil) Rosenthal[2] have already described the process of this new departure, which apparently owes its existence to the last-named. The achievement does not admit of any immediate criticism. It matters little what the first films are like, or what they actually reveal. If the fact is once established, and the technique is improved gradually, as is always the case, then we may look to the cinematograph to unveil some highly interesting secrets, which Nature has hitherto kept well concealed.

OLEIC ACID IN THE DIAGNOSIS OF GASTRIC CARCINOMA.

CLINICAL methods employed for the differential diagnosis of gastric diseases are fairly numerous, and while several of them taken in combination with others may lead to a correct differentiation between cancer and benign affections, this is not always possible, especially when the test is most needed—namely, in the very earliest stages. It has been known for a few years that some relation existed between malignant tumours and haemolysis, and an attempt was made in 1908 to utilize this knowledge for the diagnosis of cancer of the stomach. Dr. E. Graefe and Dr. Röhmer worked with an ether extract of the gastric contents after a trial breakfast and tested the extract for its haemolytic power, comparing the extract from cases of cancer with that from healthy persons. Since that time, they have found that the haemolytic power was never present in healthy persons, was present in 1 case out of 112 of non-malignant stomach affections, in 10 out of 61 ulcer of the stomach cases, in 26 out of 36 suspicious cases, in 42 out of 42 cases of undoubted cancer of the stomach, and in 52 out of 56 cases of cancer diagnosed at the operation or *post mortem*.[3] The authors claim that these results have been confirmed by others, but that Fabian, working in Garré's clinic, failed to obtain haemolysis in cancer cases in which there was marked gastrectasis. They explain this negative result on the assumption that it is impossible to wash the stomach out completely in these cases and that the haemolysin is therefore diluted in proportion to the amount of fluid or food left in the organ. Fränkel, on the other hand, is said to have met with positive haemolysis in 44 per cent. of his non-malignant cases. The authors suggest that the presence of bile and of trypsin would explain these results. They think it essential to exclude all traces of bile or intestinal content. Following up their own work on this subject, they came to the conclusion that the haemolysis might be due to oleic acid. On employing Hübl's method of detecting this acid, they succeeded in isolating it in each case in which the haemolysis was present and they failed to find it in the negative cases. It is unnecessary in this place to follow the authors through their chemical analyses or to give all the details of the tests as employed. It is sufficient to state that out of 77 non-malignant cases, it was only present twice, and in 22 undoubted cases of cancer, oleic acid was found in all cases but one in which there was marked gastrectasis. (It would perhaps be more correct to speak

[1] *Deut. med. Woch.*, No. 29, 1910.
[2] *Zeitschr. f. Röntgenheilk*, vol. xii, 1910.
[3] *Muench. med. Woch.*, Sept. 20th, 1910.

of the iodine binding power lying outside the normal limits than of the positive find of oleic acid, since the test depends on a quantitative result.) The authors cite a few cases to illustrate the clinical significance of the reaction. In a case of a man who had suffered from gastric symptoms for nine years (pain and vomiting), no other symptoms pointed to a malignant growth. A trace of blood in the gastric contents raised suspicion, but the free hydrochloric acid and the increase in weight was rather against the diagnosis. The test proved positive. An operation revealed a commencing carcinoma in an old ulcer scar. The regional glands were slightly affected, and the growth and glands were removed with ease. In two other cases the clinical symptoms pointed strongly to cancer, but the test was negative. The *post-mortem* examination in the one case, and the operation in the other, proved that neither were cases of cancer. These results require confirmation on a large scale. They have the prima facie appearance of being of great importance, since there is no doubt that the only chance of recovery at present in malignant disease of the stomach lies in a very early diagnosis and early operation. The test is not difficult to carry out, but requires some care and skill. If its significance be confirmed, there need be no reason why it should not be freely used clinically and in private practice.

LOCAL ANAESTHESIA FOR OPERATIONS ON THE FACE.

SINCE Oberst and Schleich first published their articles on local anaesthesia, the various methods have been freely used in the Groningen clinics. The work has been materially favoured by the researches of Braun. At present more than one-third of all operations are performed under local anaesthesia. Some difficulty has been experienced in introducing a satisfactory anaesthesia for operations on the face and oral cavity, but in the course of his investigations on deep injections of alcohol into the trigeminal nerve, H. K. Offerhaus was able to plan a new way of inducing local anaesthesia.[1] He employs cocaine (0.5 to 0.75 per cent.) and injects from 2 to 2.5 c.cm. The advantages of operating under local anaesthesia when removing the superior maxilla or other structures in proximity of the mouth are obvious. It is a common experience that general anaesthesia for face operations is unsatisfactory and extremely difficult to keep steady; the blood flowing into the mouth forms a danger to the patient and may necessitate a preliminary tracheotomy with tamponage of the trachea or other safeguard against aspiration of blood into the air passages. On the other hand nervous patients wish to be unconscious during an operation. The author only applies local anaesthesia to patients who are not markedly nervous, and usually induces a partial sense of indifference by injecting morphine and scopolamine before the operation. The injections of cocaine can be made withou any preliminary experiments on the cadaver or animal. He gives the points of puncture and depth as follows: For anaesthetizing the third branch of the trigeminal, the distance between the two malar bones immediately in front of the maxillary joint (that is, the distance between the articular tubercles) is measured by means of callipers. This he calls a. Next the distance between the superior alveolar processes, measured behind and externally to the last molar teeth within the mouth is determined with small callipers. This is the distance between the two foramina ovalia, and is called b; $\frac{a-b}{2}$ = the depth to which the needle must penetrate in the direction of the intertubercular line to hit off the third branch. As soon as the needle touches the nerve the patient feels a sharp pain right along the course of the nerve. For the second branch, the distance between the middle of the malar bones is called a' (*D. interzygomatica*); b' is the distance between the superior alveolar processes measured behind and internal to the last molar teeth, and corresponds to the distance between the two foramina rotunda; $\frac{a'-b'}{2}$ = the distance of the second branch from the surface along the interzygomatic line. In this case the needle is inserted immediately below the malar bone, and is directed very slightly upwards. Offerhaus gives details of cases in which this method has been employed with success. He recognizes that Schlösser's, Levy's, and Baudouin's methods also yield good results, but they necessitate previous experimentation on the cadaver. In two of his cases no anaesthesia resulted. He was able after the operation had been completed under general anaesthesia to demonstrate that the nerve had been displaced considerably by a carcinoma in the one and by a sarcoma of the maxilla in the other. In all the other cases the nerve was reached with accuracy and prolonged anaesthesia resulted. With 0.5 per cent. solutions it lasted for one and a half hours, while after 0.75 per cent. solutions it lasted for about five hours. He also mentions that he has treated 12 cases of severe trigeminal neuralgia with injections of 80 per cent. alcohol applied in the same way. In 10 of these the cure was complete, in the eleventh considerable improvement took place, while in the last, a case of central disease, the injection was not followed by any amelioration.

[1] *Deut. med. Woch.*, August 18th, 1910.

THE DETECTION OF TUBERCLE BACILLI.

SINCE Koch discovered the tubercle bacillus the diagnosis of doubtful cases of illness has been materially assisted by the search for the bacilli. Physicians of old based the diagnosis exclusively on physical signs, and pathologists were satisfied with the macroscopic and microscopic appearances in forming an opinion whether the case was one of tuberculosis or not. Nowadays more direct evidence is demanded. Where there are but few bacilli present it may be extremely difficult to detect them, and the bacteriologist has learnt that a negative result in the examination of a microscopical preparation by no means excludes the existence of the disease. For clinical purposes the employment of animal experiment in these obscure cases has disadvantages. Five weeks is a long time for the practitioner to be kept in doubt as to the true nature of the affection, and this time is required for the most susceptible animal, the guinea-pig, to develop the disease. Some shortening of this period has been brought about by certain modifications of the inoculation, such as the bruising of the inguinal glands and the like, but even then the time is too long for practical requirements. Again, if the bacilli are associated with other organisms the animals may die of the associated infection before the tuberculosis has manifested itself. It was, therefore, of importance to find a means of removing other germs from a fluid which may contain a few tubercle bacilli. A short time ago such a method was described by Uhlenhuth. This consisted in treating the fluid with antiformin, a mixture of hypochlorite of sodium and sodium hydrate, by means of which the other organisms are dissolved, and the tubercle bacillus is not damaged. After centrifugalization the bacilli may be sought for directly in specimens prepared from the sediment, or if they are still too few in number

this may be injected into guinea-pigs without fear of other infection. Hoffmann[1] finds that this means may be of considerable use in determining the nature of a mild or early lesion. He takes a piece of suspicious tissue of the size of a lentil or slightly larger, crushes it with forceps, and rubs it on to a microscopical slide. After it has nearly dried he pours a 15 to 20 per cent. solution of antiformin to cover the whole slide, and places it in the incubator until the following day. The tissue is then dissolved, and the fluid has evaporated to form crystals. These latter are removed by carefully applying some water, and the water is removed in such a way that as little as possible of the remaining substance is washed away. The specimen is then stained with carbol fuchsin and counterstained with methylene blue after decolorization with acid. Preparations treated with antiformin in this way were compared with specimens prepared without it from the same tissue. He was struck by the number of tubercle bacilli which became visible in the antiformin preparations, and the sparcity of them in the control slides. It would thus appear that it is unnecessary to wait after inoculation of a guinea pig until the disease has fully developed if this method is confirmed by other investigators. That it is likely to be so confirmed is shown by the fact that antiformin has been used with excellent results in this country, and has gained a definite place among the reagents on the bacteriologist's shelf.

THE PREVENTION OF PLAGUE IN INDIA.

THE report of the Punjab Plague Committee for the year 1910 contains twenty-six definite recommendations and conclusions. Some of the more important of these are as follows: (1) An active antiplague policy on the part of the Government is necessary and should be continued. (2) The destruction of rats by means of poisoning and trapping on the present lines does not yield results commensurate with the expenditure incurred and should be discontinued; the greatest prospect of success in preventing the spread of plague by means of rat destruction consists in attacking the comparatively few localities where plague persists during the quiescent period. (3) Antiplague inoculation is essentially a personal prophylactic measure, and in recommending its adoption everything savouring of compulsion or pressure should be carefully avoided. (4) For dealing with plague epidemics in villages evacuation is a most important antiplague measure. (5) The disinfection of infected houses during the course of an epidemic, or after its cessation, is not ordinarily necessary, but disinfection, as applied to the clothing and baggage of persons coming from infected areas, is a valuable means of preventing the spread of plague into uninfected areas and should be carried out wherever possible. (6) The only measures of a compulsory nature which are permissible are those demanded by public opinion and capable of being put into operation by the people themselves. Other recommendations deal with measures facilitating quarantine and isolation, and the extension of legal powers to the inhabitants of towns, as well as villages, to prevent the access of persons coming from infected areas, is advocated.

THE ANALOGIES BETWEEN SYPHILIS AND TRYPANOSOMIASIS.

IN the address delivered by him as President of the Section of Pathology of the Royal Society of Medicine last week, Dr. Mott had some interesting remarks to make regarding analogies and differences between the *Spirochaeta pallida* and the *Trypanosoma gambiense* in relation to man. Among resemblances, he pointed to the early phenomena of infection, the irritation or sore occurring at the point of inoculation, to the period of incubation, to the local gland enlargement, followed by a general infection of the lymph stream, and to the erythematous rashes due to migration of the parasites and accompanied by constitutional disturbances. It was also suggested that possibly the fashion in which the two organisms originally used to invade man was also the same; while the *T. gambiense* is still conveyed to man by a specific fly, the *Glossina palpalis*, it is recognized that the *T. equiperdum* owes its power of transmitting dourine disease, or *mal de coit*, from horse to horse, to the fact that it has acquired the habit of perpetuating its species by multiplying in the mucus fluid found at mucous orifices. Possibly the *Spirochaeta pallida* has also likewise acquired new habits, and though now transmitted direct from man to man was at one time dependent on the assistance of a biting insect, just as still is the spirochaete of tick fever. Other resemblances to which allusion was made are the occurrence in both of polyadenitis and lymphocytosis. The same drugs, too, which avert affections of the nervous system in syphilis seem capable, if only rarely, of averting the onset of the symptoms which have led to human trypanosomiasis being termed "sleeping sickness." There are also certain points of resemblance in the histological changes produced in the nervous system by the two organisms and in the clinical symptoms resulting therefrom. But here we arrive at points of difference likewise. For instance, in practically every case *T. gambiense* sets up chronic inflammatory affection of the lymphatics of the central nervous system, while in spirochaete infection invasion of the nervous system is evidenced only in from 5 to 10 per cent. of even untreated cases. In human trypanosomiasis the subarachnoid space is always invaded, but even when the *Spirochaeta pallida* invades this space it remains in all probability confined within the lymphatics, and does not become free in the cerebro-spinal fluid. This circumstance becomes readily explicable when the two organisms are examined under the ultramicroscope, for this shows that while the *Spirochaeta pallida* moves only very slowly and in screw-like fashion around its long axis, the movements of the *gambiense* are extremely active, and may easily enable it to penetrate the delicate walls of capillaries, and thus find its way into the cerebro-spinal fluid. In addition, while *T. gambiense* can usually be found in the blood with ease, the *Spirochaeta pallida* can not, and seems able to multiply only in lymph spaces and channels. Dr. Mott also expressed the opinion that possibly the deadly results of infection by *T. gambiense* as compared with other trypanosomes is due to *T. gambiense* having acquired the habit of migration into the subarachnoid space. He had also some suggestive remarks to make on the higher pharmacology of drugs, such as organic forms of arsenic; possibly their trypanocidal and spirillocidal action was due to their stimulating phagocytosis; possibly to their having an affinity for the phosphorus-containing lipoids of the periplasium membranes of the organisms in question. On the other hand, the toxic effects of organic arsenic might be due to its union with the lecithins of the nervous system. Patients, therefore, seem to stand between the devil and the deep sea.

EXTIRPATION OF UTERUS AND VAGINA FOR TUBERCULOSIS.

WERTHEIM'S operation, by which the cancerous uterus is removed together with the surrounding tissues, is now frequently performed. It involves free dissection, yet some British operators, such as Dr. F. J. McCann, maintain that as cancer tends to extend

[1] Hoffmann, *Deut. med. Woch.*, July 14th, 1910.

towards the vagina the walls of that canal also should be freely removed, the dissection being carried down much lower than is usually practised when Wertheim's method is adopted. A report of much interest to the surgeon and to the specialist has appeared in a foreign medical magazine.[1] The disease which brought the patient to the operating table was not cancer but tubercle. From a purely surgical point of view the extirpation of a tuberculous focus may prove harder, more impracticable indeed, than the total removal of an area of cancer. Stoeckel of Marburg undertook the treatment of a case of tuberculosis of the vagina. It appeared to be primary, but proved to be secondary. The patient was 28, married, and sterile; the husband was free from tubercle in any form. There was a flat round deposit on the vesico-vaginal septum as big as a crown piece immediately below the anterior fornix; it discharged into the vagina through three fistulous tracts, yet the vaginal wall was not fixed, nor was there evidence of infection of the uterus, appendages, or bladder. Inoculation gave positive results. Free scraping was followed by temporary benefit, but soon afterwards the parametrium was found to be infected on both sides and the uterus fixed in deposit as hard as stone. Great mental disturbance set in, amounting to melancholia. Stoeckel operated after the method now in vogue for the extirpation of the cancerous uterus. The operation proved extremely difficult, especially at the stage when the ureters had to be dissected up so as to be placed out of harm's way. The abdominal wound was closed and the whole vagina and the surrounding tissues were dissected away from below. The patient bore the operation well, indeed, the neurotic symptoms at once disappeared. Unfortunately during the second week the anterior wall of the rectum sloughed and a fistula formed which Stoeckel intended to cure by operation should it not close spontaneously. The opening of the peritoneal cavity proved that the vagina was not the primary seat of disease. The serous membrane was covered with miliary nodules, and there were strong adhesions between the uterine appendages and the intestines. The Fallopian tubes seemed to be the original seat of tuberculous affection. Stoeckel promises that the after-history of his case will be reported in full. The experiences of the Wertheim school seem to show that uterine cancer may be extirpated if taken in time, though the doctrine is not universally accepted. Without doubt a tuberculous Fallopian tube may be removed with good results, although the uterus must be sacrificed as well, since the stump of an infected tube is a great source of danger. Unfortunately it often turns out that the disease is less limited than was at first suspected.

PSEUDO-HOURGLASS STOMACH.

THE detection of hourglass stomach is often quoted as one of the greatest triumphs of radiography; the more important it becomes, therefore, to understand why in certain cases a subsequent operation has belied a definite *x*-ray diagnosis and has shown no hourglass condition to be present. Herz[2] mentions three conditions in which hourglass stomach may be simulated. The first may occur through the patient being given a suspension of bismuth in milk instead of a bismuth meal, and being examined in the horizontal instead of in the vertical position. Most observers now examine in the vertical position, however, so that this cause of error may be dismissed. Herz goes on to point out that there is such a thing as functional hourglass stomach, which may be mistaken for the organic condition. It occurs in cases when severe atony coexists with gastroptosis. The walls of a dropped stomach of deficient tone fail to contract upon the gastric contents, so that the food drops at once to the most dependent part of the organ, which sags more deeply as the quantity of food present increases. The horizontal upper limit of the gastric contents is therefore abnormally low, and only rises slowly as more food enters the stomach. The fundus being fixed, the food and gastric secretion exercise a considerable tension upon the body of the stomach, which is greatly stretched. The passage between the fundus and the dependent part of the stomach becomes increasingly narrower, until finally its lumen is completely obliterated, the stomach now being divided into an upper air-containing portion and a lower and much larger portion containing the food and a small quantity of gas. If more food is swallowed, it remains in the upper part of the stomach, and small quantities can be seen periodically shooting through the neck to join the main portion of the gastric contents. Therefore it is necessary in all doubtful cases to examine the patient at short intervals while the bismuth meal is being taken. Yet another cause of confusion in diagnosing hourglass stomach is the presence of an ulcer situated in the lesser curvature and adherent to the left lobe of the liver. When the patient stands the stomach tends to assume a vertical position. The ulcer being fixed to the liver, a line of tension is produced diagonally across the stomach. The greater curvature is held up at the point where the line of tension meets it, and the part of the stomach immediately above tends to sag down. The apparent constriction disappears when the patient lies down, as does the functional hourglass condition. Herz, therefore, recommends examination in the horizontal as well as in the vertical position before a diagnosis of hourglass stomach is made.

PREGNANCY AFTER REMOVAL OF FALLOPIAN TUBES.

Certain obstetricians consider that when Caesarean section is performed the subject, should the pelvic deformity be extreme, ought to be sterilized by excision of the Fallopian tubes. Three cases recently reported by Dr. J. O. Polak, of Brooklyn,[3] show, as has been already shown, that removal of the tubes may be followed by pregnancy. A woman, aged 21, underwent a series of operations in March, 1906; the perineum was repaired, the curette applied to the uterus, the vermiform appendix amputated, and the left tube and ovary removed. She afterwards bore two children, yet in June, 1909, she underwent amputation of the cervix, repair of the pelvic floor, and removal of the right Fallopian tube. Two months later the patient became pregnant and was delivered apparently at term, labour being uncomplicated. In the second case the patient was 28, and subject to axial rotation of a dermoid of the right ovary, which was removed with the right Fallopian tube. The uterine end of the tube was excised "well into the right cornu." This operation was performed in May, 1908. The periods did not appear in July and August, and in September the patient underwent another abdominal operation on account of an attack of acute internal haemorrhage. It was found to be due to rupture of an interstitial gestation sac in the right cornu of the uterus. Dr. Polak asks how the fecundated ovum managed to migrate into the interstitial portion of the right tube, and develop there

[1] Stoeckel, Report of a Meeting of the Mittelrheinische Gesellsch. f. Geb. u. Gyn., *Monatsschr. f. Geb. u. Gyn.*, September, 1910, p. 371.
[2] *Archives of the Roentgen Ray*, September, 1910.
[3] Report of Three Cases of Pregnancy following Salpingectomy. *Amer. Journ. Obstet.*, October, 1910, p. 676.

when that tube had been previously excised, and the peritoneum and uterine muscle sewn over the wound in the cornu. In this instance, however, the left appendages remained. The third patient was a sterile young married woman, infected with gonorrhoea shortly after marriage. Both Fallopian tubes were amputated in the usual manner, but not excised at the cornua. Several years afterwards the periods were missed once, and a month later a severe attack of abdominal pain set in, followed by uterine haemorrhage. Douglas's pouch was opened, and blood escaped; abdominal section was performed, and an interstitial pregnancy discovered in the stump of the right tube, which was attached to the corresponding ovary by adhesions. The sac was successfully excised. It was noted that the remains of the left tube, 1.5 cm., or about three-fifths of an inch long, projected from the left cornu of the uterus. Thus, as Dr. Polak observes, this case illustrates the possibility of tubal stumps becoming patent after ligature and amputation of the free and isthmic portions of the Fallopian tube. The late Professor J. W. Taylor performed Caesarean section twice on a rachitic dwarf, applying ligatures to both tubes on each occasion.[2] Christopher Martin did a third Caesarean section on the same subject and excised the tubes and adjacent tissues of the uterine cornua. More than once pregnancy has followed when the ovaries and tubes have been removed for chronic inflammatory disease. More correctly, we should say that the ligatured stumps of the tubes and probably a piece of ovarian tissue were left behind, and that the tubal canals managed to become pervious through relaxation of the ligatures. Hansbury Sutton, Gordon of Portland, U.S., and J. Anderson Robertson have related cases of the kind.[3] These experiences show that, should sterilization be necessary, it is hard to effect it by operations on the Fallopian tubes, even excision of part of the uterine cornu being sometimes ineffectual, as is shown by Polak's second experience. Many cases have been reported, none more clear and instructive than Polak's. The fact remains that a metro-peritoneal fistula often develops when the cornu is excised, and may prove quite sufficient for the transmission of ova and spermatozoa.

Lord Ilkeston will distribute the prizes at the Westminster Hospital Medical School at 4 p.m. on Thursday, December 15th.

The Japanese Government has increased its donation to the funds of the Hygiene Exhibition to be held at Dresden in 1911 from £25,000 to £35,000.

Medical Notes in Parliament.

Parliament assembled again, after the adjournment, on Tuesday last. The House of Commons met at the usual hour of 2.45. All the benches and galleries were crowded by members who had come up to learn what course the Government had decided to pursue in consequence of the failure of the Conference on the Constitutional difficulty. After prayers, a little formal business was transacted, and the roll signed by two members who had not previously observed that formality. After a series of questions from the Labour benches respecting the use of the military forces in South Wales in connexion with the colliery disputes had been disposed of the Chancellor of the Exchequer, in the absence of the Prime Minister, moved the adjournment of the House till Mr. Asquith could attend and make his statement of the intentions of the Government. It was proposed at first that the statement should be made on Thursday, but as this was objected to by Mr. Balfour as inconvenient on account of his public engagements it was finally agreed that the adjournment should be till Friday. This arrangement flattened out the excitement in the Chamber, and men dispersed to the Lobbies to talk over the nature of the announcement to be made on Friday, and calculate dates for the General Election. It was generally felt that the constituencies would be appealed to without delay, and that a new House of Commons would be elected before Christmas. Other rumours were also circulated to the effect that the Ministry would resign instead of appealing to the electors. The members' lobby was consequently filled most of the evening by knots of excited members discussing the situation. In the meantime the debate on the adjournment went on in the Chamber, Mr. Keir Hardie and the Labour members criticizing the conduct of the police at Tonypandy, and condemning the drafting of troops into the district. They asked for an inquiry. The Home Secretary replied, defending the action of the police and justifying the movement of the military, and then said he could not grant an inquiry. A warm discussion next arose on the methods of valuation under the Finance Act, in which Mr. Pretyman and the Chancellor of the Exchequer took the chief parts. The motion for the adjournment was then put and a division was challenged by the Labour members, which resulted in the adjournment being carried by 168 to 41.

The House of Lords met at half-past four, and Lord Crewe referred in feeling terms to the loss the country had sustained in the death of Lord Spencer. Lord Lansdowne followed with a warm tribute to the high character and the great public services of the late Earl. It was then explained by Lord Crewe that he was unable to make a statement on the course of public business, as the Prime Minister had been unable to do so in the Commons. On this Lord Lansdowne rose and declared that he was unprepared for such complete inability to state the course of business, and gave notice that he would move on the next day that the Government be invited to submit without delay the provisions of the Parliament Bill to the House. He took the opportunity of denying certain statements that had been made in the press with reference to the causes of the breaking up of the Conference. Lord Crewe replied briefly, and after some questions had been answered the House adjourned at ten minutes after five. On Wednesday the House of Lords assembled in great numbers to hear Lord Lansdowne make his motion for the introduction of the Parliament Bill. He made a speech in which he reviewed the whole situation, and Lord Crewe replied that the Government had no objection to introduce the bill, and that he would move the first reading at once. The discussion was continued by Lords Rosebery and Balfour of Burleigh, and at its conclusion the bill was introduced. Lord Rosebery gave notice to proceed with his resolutions on Thursday.

The Legislative Programme sketched out for the remainder of the session has been abruptly upset by the political crisis. The order paper for Tuesday contained no less than twelve Government bills and thirty-nine other bills for consideration. The Shops Bill (No. 2), which it was intended to push through Parliament, was the first measure in the list, and it was anticipated that with the promised modifications it would make a popular Act. Its chances are for the present destroyed. The Public Health (Health Visitors) Bill was a second measure which a week ago had fair prospects and is now lost. Only the absolutely necessary Acts are likely to be passed before the appeal is made to the country, and a new Parliament will have to take up the arrears of work. If no General Election is decided upon at once—and absolute certainty does not exist at the moment of writing—there will be other changes, which will necessarily upset the programme of work originally laid down for the autumn session.

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[2] Fallopian Tubes Ligatured Twice at Previous Operations, and Removed in the Case of a Third Caesarean Section, *Medical Press and Circular*, December 21st, 1904.

[3] Renewal of Menstruation and Subsequent Pregnancy after Removal of Both Ovaries, Journal, vol. ii, 1890, p. 722.

England and Wales.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

LONDON.

Hygienic Results of the Provision of School Meals.

The Board of Education has asked the London County Council to report as to the extent to which the provision of meals for necessitous children has increased the ability of the children to take full advantage of the education provided for them, and to what extent their manners and conduct have improved under the discipline employed. The Board states that it attaches great importance to the close association of the work done under the Provision of Meals Act, 1906, with the work of the school medical service, and desires to be fully informed of the arrangements made for securing co-operation between the school medical officer and his staff on the one hand and the canteen committee and its officers on the other, in respect of the recommendation or selection of children, the regulation of the dietary, and the observation of the physical or hygienic results attributable to the meals.

The Education Committee recommended at the meeting of the Council on November 15th that the Board of Education be informed that the general appearance of the average necessitous child had been improved by the supply of meals. "To arrive at any estimate as to the comparative ability of children was most difficult, however, as under the Council's scheme children were not allowed to remain unprovided with food except during holidays." With a view to training the children to be well mannered, a list of rules had been approved for the guidance of the supervisors in the management of dining centres. In cases where it had been impossible to obtain adequate voluntary supervision it was proposed to employ paid supervisors, and some had been appointed already. Reports on the nutrition of the children had been submitted to the Board in the report of the Medical Officer of Health (Education), 1908 (pp. 16–20). On this question the committee pointed out that no absolute standard existed as to what was and what was not healthy nutrition. Necessitous children were not necessarily ill-nourished at the time of application for aid, and in such cases there was not always immediate need for medical inspection. Home conditions such as overcrowding, lack of sunlight, and insufficient sleep, contributed to produce the typical appearance of a necessitous child. Consequently, the care committees relied to a great extent on the circumstances of a family as revealed by interviews with the parents and by home visits, no hard and fast rule as to "necessity" being adopted. So varying were the circumstances that practically every case had to be considered on its individual merits. In some cases sufficient food seemed to be available and yet the child remained ill-nourished. This might be due to insufficient building up of the tissues, either from unsuitable food, from lack of power to digest food—as in the cases of bad teeth or indigestion—or from lack of power to assimilate the food when digested. Again, another cause might be the excessive breaking down of the tissues, occurring in conditions of nervous irritability such as accompanied insufficient sleep, attacks of vermin, chronic fatigue and overwork, and constant, though perhaps slight, febrile illnesses. Such cases fell within the purview of the school doctor. There was always co-operation between the public health department and education service through the school teacher. The records of the school medical inspections were always at the disposal of head teachers and care committees, and were consulted when children were being selected for the provision of meals. The head teacher indicated to the school doctor the children who appeared to be in need of special treatment, and the school doctors often recommended that inquiries should be made by the care committees into the home circumstances of individual children. In special cases of delicate or anaemic children milk or cod-liver oil was recommended by the school doctor, and if the case was approved by the Care Committee this was supplied to the children at the cost of the Council. The menus for the school meals had been drawn up in consultation with the school medical officer.

[The report had not been reached when the Council adjourned at midnight on Tuesday, November 15th.]

Board of Education and Accommodation for Defective Children.

In communicating its decision to recognize for a definite period only a temporary school for mentally defective children, the Board of Education intimated that it strongly deprecated makeshift arrangements for providing education for these children, and urged the Council to proceed to complete with all possible dispatch the survey of accommodation for defective children. This survey should be extended to schools for physically defective children, as during the year ended March, 1909, eleven schools for mentally defective and eleven for physically defective children were seriously overcrowded, deductions having to be made from the grant in respect of two schools in each category. Similarly during the year ended March, 1910, so far as the review of claims for grant had yet gone, seven schools for mentally defective and eleven for physically defective children had been found to be overcrowded, and the grant had been reduced in some cases. The Board hoped the Council would put matters on a satisfactory footing without delay.

The Education Committee stated that a survey of the accommodation for mentally defective children had now been made, and proposals for providing 705 additional places to meet immediate needs had been submitted to the Finance Committee. That committee had suggested that the first question to decide was the principle involved in the provision of additional permanent accommodation for mentally defective children pending the result of deliberations on the report of the Royal Commission on the Care and Control of the Feeble-minded—still under the consideration of the General Purposes Committee. In the circumstances the Finance Committee had adjourned the consideration of the proposals for providing additional places.

Private and Pauper Asylum Patients.

The Hampstead Board of Guardians, in a letter to the London County Council, recently raised an interesting question with regard to the admission of paying patients into London county asylums. The guardians pointed out that their officers took considerable care to inquire into the ability of relatives to support inmates of the asylums, and the collector was paid a commission on the amount he obtained from relatives of patients. When the London County Council took over cases in which relatives paid the full cost, would it be possible, the guardians asked, for the Council to pay their collector the commissions that he lost?

The Asylums Committee, in a report to the Council, pointed out that the whole question of keeping a patient unnecessarily and unjustly under the stigma of pauperism was involved in the board of guardians' request. So long as the payment for a patient's maintenance was made to the Council by a board of guardians the patient remained a pauper, even though the guardians might recover the whole cost of maintenance from his friends or his estate. But if the expenses of maintenance were paid directly to the asylum, the patient ceased to be "chargeable to a union," and became a private patient. It had been decided, in the case of Regina *v.* Jones *re* Stennett, that it was the duty of the Asylums Committee to ascertain the means of patients, and to classify them as private patients when they were entitled so to be regarded. When a patient was placed on the private list, a parish collector no longer recovered the cost of maintenance, and the Council could not pay commission to a collector in respect of work he was not doing.

Recovery of the Cost of Dental Treatment.

A scheme—which, however, was withdrawn by the subcommittee concerned—appeared in the agenda of the Education Committee of the Council last week for fixing the scale of charges to parents in respect of dental treatment of school children. The subcommittee stated that in fixing a charge it had to be borne in mind that unless there was actual suffering parents generally did not recognize at present the need for dental treatment. The obligation placed on the Council by the Act to make a charge might militate against dental treatment being obtained, and it seemed desirable, until the importance of dental treatment was more widely realized, that inducements for obtaining treatment should be as great as possible. The subcommittee suggested the following charges: 2s. 6d. for the complete treatment of the mouth where stoppings were included; 1s. 6d. where the treatment consisted of extractions under gas; and 6d. for simple extractions. Where more than one child in a family required dental treatment half the amount charged for the first child should be charged for each additional child, provided the net family income was 25s. or under. Legal proceedings to enforce payment would not be taken where the net income fell below 17s. 6d. a week, and in the case of incomes below 30s. remissions would be made according to circumstances.

Payment of Medical Men called in to assist Midwives.

The Woolwich Borough Council has sent a circular letter to the other metropolitan borough councils with reference to the provisions of Section 17 of the Midwives Bill, relating to the payment by boards of guardians of fees to medical practitioners summoned upon the advice of a certified midwife in cases of emergency, more particularly in cases of infants suffering from inflammation of the eyes, stating that the Woolwich Borough Council are strongly of opinion that the London County Council should be the authority to pay the fees of medical practitioners instead of the board of guardians, and that the Lord President of the Council has been asked to amend the bill in the direction indicated. The other metropolitan borough councils are requested to take similar action.

MANCHESTER.

Medical Students' Hostel.

For some time time past it has been felt that the senior medical students attending the Manchester Royal Infirmary laboured under a great disadvantage in not being able to find suitable lodging accommodation near the infirmary. Since the infirmary was removed to its present position near the university, there has been a considerable saving of time formerly spent in travelling backwards and forwards to Piccadilly, but there are still many students who are compelled to reside a considerable distance from the university and the infirmary. It is therefore proposed to provide a hostel for the senior medical students, and several houses in Nelson Street, which adjoins the infirmary, will be taken for the purpose. In a circular that has been issued, asking for donations to the capital fund and a contingency fund, it is stated that "the object of the scheme is to enable students to gain experience in the management of accident and urgency cases, and in the observation of acute disease, so that they may be better fitted for the emergencies with which they will have to deal, both as residents in the hospitals and in private practice. Experience of this sort can be acquired only by students residing close to the hospital, and permission for these facilities has already been granted by the board of management." It is said that the hostel will not interfere with existing residential halls, as it is intended only for medical students during the final part of their term of study. It is proposed to start the hostel on a modest scale, providing for about ten students, at a weekly charge of 25s. each inclusive, and to give it a trial for three years. The hostel will, of course, be under the care of a responsible warden. It is estimated that there will be an initial capital expenditure of about £600, and it is desired to have £200 a year guaranteed for three years for working expenses and contingencies, though it is fully hoped that after the first year there will be no call on the contingency fund, and that the hostel will soon become self-supporting. A considerable number of contributions have already been received, and the scheme has the support of the Dean of Manchester, Sir A. Hopkinson (Vice-Chancellor of the university), the board of management of the infirmary, and practically all the members of the medical and surgical staff. Contributions may be sent to Mr. Joseph Bell, 2, Portland Street, Manchester, or the honorary secretary, Dr. Tylecote, the Royal Infirmary, Manchester.

Housing of the Working Classes.

A new experiment in provision of housing accommodation for the working classes is now under consideration in Manchester. In various parts of the city the Corporation has already built blocks of dwelling houses largely to take the place of insanitary property that has been demolished. The model dwellings erected are let either entire or in apartments, but it is found that many working people cannot take advantage of the provision, as they have not the money to buy furniture and they resort to furnished apartments elsewhere. Some members of the Sanitary Committee have accordingly thought that the Corporation might try the experiment itself of providing furnished houses, or at any rate furnished apartments. It is possible that new houses will be erected and furnished throughout to meet the want, but for the present the experiment will probably be confined to the vacant rooms in the existing model dwellings.

WEST YORKSHIRE.

Boric Acid as a Food Preservative.

A case of considerable interest in connexion with the use of boric acid as a food preservative was heard at the Bradford city police court recently. A dealer in shrimps at Morecambe was summoned for selling in Bradford pickled prawns containing 0.916 per cent. of boric acid. This was nearly 63 grains of boric acid to the pound of shrimps. The Bradford Corporation maintained that no boric acid was allowed at all by law, although exception was not taken up to 35 grains to the pound. The medical officer of health contended that over 0.5 per cent. of boric acid was injurious. Medical evidence for the defence contended that shrimps were readily prone to decomposition, and it was much safer if they were preserved by a considerable quantity of boric acid rather than that they should be eaten in an unwholesome condition. The quantity, too, of shrimps eaten at any one meal was small, and they were only taken sporadically, not, like milk or butter, daily.

The stipendiary gave judgement after a fortnight's consideration. He came to the conclusion that a dose of over 20 grains of boric acid might possibly be injurious. He considered that a ½lb. of preserved prawns would be more than could reasonably be expected to be consumed at one time by an ordinary person. With the percentage alleged to be in the sample taken from the defendant this amount would contain about 15 grains. This amount he thought would not be injurious. He accordingly dismissed the summons.

LIVERPOOL.

Liverpool Medical Students' Dinner.

The annual dinner of the Liverpool medical students will be held at the Exchange Station Hotel on Saturday, December 17th, at 7.30 p.m. All past students will be welcomed. Tickets can be obtained from the honorary secretaries of the dinner, Messrs. J. P. Rafter and T. H. Martin, Liverpool Medical School, Liverpool.

WALES.

Cardiff Nursing.

On November 4th the members of the Cardiff Nursing Division of the St. John Ambulance Brigade (No. 7 District) were presented with the certificates, medallions, and labels obtained by them as the result of their successes in examinations. There was a large attendance, presided over by Dr. T. Wallace, who was supported by Sir John and Lady Duncan, Drs. W. G. Williams (honorary surgeon of the division), De Vere Hunt, D. R. Thomas, Barnardo, F. Davies, and W. C. Anderson, Superintendent J. Davies, and Inspector J. Bell. The Chairman, in his address, said that in his opinion there was no work more interesting or calculated to be more useful and helpful than ambulance work. He was greatly pleased to find that that nursing division had been so successful in its first year, and hoped that its work would spread throughout the city. Miss J. McCallum, the honorary secretary of the division, read the report for the first official year ended September 30th last. This stated that the division was formed with 35 ladies, of whom 8 had since resigned, but 9 others had joined, and the present strength was 33 nurses, 3 officers, a doctor, and a drill sergeant—a total of 38. Twenty-seven members had passed their re-examination for efficiency—2 for first-aid certificates, 8 for nurses' certificates, 10 for medallions, and 19 for labels. There had not been a single failure during the year. Thirty-one first-aid cases had been attended privately by members. There was a complete voluntary aid detachment of the British Red Cross Society in connexion with the division, which is registered by the War Office as Detachment No. 2 of the Glamorganshire Branch of the British Red Cross Society. Thanks were accorded to Dr. W. G. Williams, the honorary surgeon, and others who had assisted in the work. Lady Duncan, in presenting the certificates, etc., referred to the report presented by Miss McCallum as being highly satisfactory. Presentations of a framed photograph group were made to Dr. W. G. Williams, the honorary surgeon of the division, and Sergeant Francis.

Ireland.

[FROM OUR SPECIAL CORRESPONDENTS.]

Administration of Anaesthetics.

A special meeting of the Royal Academy of Medicine in Ireland was held in Dublin on November 10th for the purpose of discussing proposed legislation regarding the administration of anaesthetics. At the invitation of the Council of the Academy several members of the dental profession attended the meeting and took part in the discussion. The following resolutions were ultimately passed unanimously:

1. That it is desirable in the public interest that the administration of general anaesthetics to render persons unconscious during any medical, surgical, obstetrical, or dental operation or procedure, should be restricted by law to registered medical practitioners, with the exception of nitrous oxide gas, and such other anaesthetics as may from time to time be scheduled by the Privy Council, which may be administered by registered dentists.
2. That provision should be made for the instruction of medical and of dental students in the administration of anaesthetics.
3. That the specification of the anaesthetic substances or drugs which may be employed by registered dental practitioners during dental operations or procedures should be made in a schedule to the proposed Act of Parliament, power being reserved to the Privy Council, on the recommendation of the General Medical Council, as the authority charged with the publication of the *British Pharmacopoeia*, to add to or vary the specified list from time to time as occasion arises.
4. That the administration of local anaesthetics for producing insensibility to pain during any surgical or dental operation or procedure by the introduction beneath the skin or mucous membrane of any fluid or other substance by means of a hypodermic needle or in any other way, should be restricted by law to registered medical practitioners, to registered dentists, or to persons acting under the immediate supervision of a registered medical practitioner or a registered dentist.

Resignation of Dispensary Medical Officers.

Notice of resignation has been handed to their respective boards of guardians by two dispensary medical officers of over forty years' standing. Dr. James Rowan, Medical Officer of the Ballyward Dispensary District, has been in his present post for forty-one years, and is now compelled to resign on account of ill health. A similar reason has caused Dr. Arthur Mussin to resign his appointment to the Glenavy Dispensary District after a service of forty-five and a half years. In both cases the resignation has been received with regret, and the question of superannuation allowance is to be considered.

Asylum Capitation Grant.

Further opinions are to hand on the questions propounded by Mr. Birrell concerning the administration of lunatic asylums. These questions were published in our issue for last week (p. 1554.) The Dublin Corporation had decided in favour of a Treasury contribution of 6s. 6d. per head; the Cork Corporation prefers that the cost of the upkeep of lunatics should be an imperial charge; the Mayo County Council also favours the defrayment of all asylum expenses from imperial sources.

County Scholarships for University College, Cork.

The Kerry County Council has unanimously decided to grant two scholarships of £50 each and two scholarships of £30, tenable at University College, Cork. Of the £50 scholarship, £30 is to be paid to a hostel recognized by the university in Cork, £10 to be paid for fees, and the balance to go to the student. The scholarships are to be given to students from County Kerry who have been resident and educated in Kerry for at least three years. The holders must be matriculated students who have passed such tests as may be prescribed by the University College, Cork.

Scotland.

[FROM OUR SPECIAL CORRESPONDENTS.]

Rest and Movement in Tuberculosis.

Dr. R. W. Philip gave the introductory address to the Edinburgh Sanitary Society on November 10th, on "Rest and Movement in Tuberculosis." Councillor Macpherson presided over a large audience.

Aërotherapy, Dr. Philip said, was serviceable, not merely in consumption, but in the treatment of most diseases. His conviction was that were the vitalizing properties of open air truly understood and realized, the larger part of disease would cease to be. The practice of continued rest in consumption proceeded from a faulty, because insufficient, conception of the disease. There was a wider conception of tuberculosis than that which concerned the local mischief in the lung. Tuberculosis implied a progressive intoxication. The toxins produced by the tubercle bacillus seemed to exert their vicious influence particularly on the neuro-muscular apparatus. The toxin was especially a muscle poison. Nothing repaired muscular tissue so certainly as natural movement. This was the guide in the institution of regular activity. As acuter manifestations disappeared under the influence of rest, and the risk of local and constitutional disturbance was reduced, the need for complete rest was lessened or removed. As recovery proceeded further, the aim came to be the restoration of physiological function. By the institution of natural movements, the process of cure or recreation was assisted, and there followed a gradual return towards the normal condition of health of every organ. The scheme of physical treatment at the Victoria Hospital and the part played by the farm colony were described.

Royal Society of Edinburgh.

Dr. Hugo de Vries, Professor of Anatomy and Physiology of Plants in the University of Amsterdam; M. Elie Metchnikoff, Vice-Director of the Pasteur Institute, Paris; and Dr. A. F. L. Weismann, Professor of Zoology in the University of Freiburg (Baden), are among those recently elected to the Honorary Fellowship of the Royal Society of Edinburgh.

Edinburgh Royal Infirmary.

Colonel William Pleace Warburton, M.D., C.S.I., has resigned his position as superintendent of the Edinburgh Royal Infirmary. Born in 1843, he entered the Indian Medical Service in 1866, and retired in 1899. During his Indian career he was medical officer to the Maharajah of Kapurthala, Principal Medical Officer and Sanitary Commissioner in Assam, Inspector General of Civil Hospitals in the North-West Provinces and Oudh, and Honorary Surgeon to the Viceroy.

There are many deeply interested in the well-being of the Edinburgh Royal Infirmary who hope that the tradition of appointing as superintendent a man who has retired at the age limit, or on approaching that limit, from the Indian Medical or Army Medical Service, will now be broken. While holding strongly that the office should be held by a medical man, they think that the superintendent of a vast hospital like the Royal Infirmary should be a younger man, thoroughly equipped in all the details of modern medicine and surgery, and of wide mental outlook. The new appointment will be scrutinized more closely than ever before.

Glasgow Royal Infirmary.

The general meeting of the qualified contributors to the Royal Infirmary of Glasgow, referred to in this column last week, was held on November 9th, when there was submitted to the meeting the following resolution:

> That it is in the interests of the infirmary that the several amendments on and additions to the charters in favour of the infirmary of 1791, 1875, and 1901 embodied in the draft supplementary charter submitted to this meeting should be made, and that the managers be requested and authorized to take such steps as may be necessary to attain that object.

The principal amendments and additions have already been indicated (page 1552). The Lord Provost, in moving the resolution, explained that since the original charter was granted, not only the infirmary but the entire city had undergone important changes, and the necessity had now arisen for a new charter. There was little doubt that the proposed changes would link with the infirmary the various public bodies more or less closely identified with it, and the result would conduce to efficiency. A protest against leaving out the clergy in the management was made by the Rev. Dr. McAdam Muir, but no amendment was moved and the resolution was adopted unanimously.

Dumfries Combination Infectious Diseases Hospital.

The new combination hospital for infectious diseases which has been erected at Parkhead, Dumfries, for cases from Dumfries and Maxweltown was opened on November 10th by Dr. Leslie Mackenzie, of the Local Government Board. The new institution has cost fully £7,000. Dr. Mackenzie, in declaring the hospital open, referred to the duty of the community in providing such hospitals for infectious disease, and also emphasized the necessity for dealing in a strenuous manner with another infectious disease—pulmonary phthisis. It was most satisfactory to find that already local authorities representing over 50 per cent. of the population of Scotland had complied with the recommendation of the Local Government Board to adopt compulsory notification of phthisis.

Enteric Fever Outbreak in Ayrshire.

Reference was made at the Ayrshire Northern District meeting on November 10th to the enteric fever outbreak in Saltcoats and Stevenson, and to the report of the Local Government Board official who was asked to investigate the matter. It appeared that a farmer had been removed to hospital suffering from enteric fever, and that his premises had been disinfected. As nothing of a suspicious nature was found to exist after this disinfection, the sale of milk was permitted. The water supply was pure and the drainage satisfactory. Of the 80 cases subsequently reported, with one or two exceptions the victims had their milk supply either directly or indirectly from this farm. The farmer voluntarily stopped the milk supply at once. The outbreak is now checked, but it is impossible meantime to determine the exact cause of the fever. The Local Government Board approved generally the steps taken to deal with the outbreak.

A New Hospital for Skye.

A scheme has been formulated to build and equip a new hospital at Broadford, Isle of Skye, in memory of Dr. Mackinnon of Strath; a site has been secured, and plans approved for a building costing £1,000; already £1,600 has been subscribed, but building operations are being delayed pending the result of a special appeal to provide a fund sufficient for endowment.

Correspondence.

NATIONAL MEDICAL SERVICE.

Sir,—Dr. Gough misreads my letter as much as he seems to do the present situation, when he finds it sneer at men who are doing sound work for the general practitioner. Curiously enough my two illustrations were both taken from the history of the consulting branches of the profession, and they were used because they describe only too accurately methods which some are applying to medical politics, and which I am sure the general practitioner would not dream of using in his practice. Those who contend that we can settle this question purely as a professional one exhibit the same neglect of essential conditions as did the undergraduate who, when he had a problem dealing with a mass *W*., said to the examiner: "I could give such a pretty solution if you would allow me to neglect *W*."

The insufficient remuneration of the medical profession for the work it does is a matter as important as it is perennial, but it is only incidental to the problem set us by the announcement of a scheme of sickness and invalidity insurance. If we are to intervene effectively, we must try to understand the problem from the Chancellor's point of view as well as from our own. From his side it is not a question of paying the doctor better rates for the work he is now doing, but of getting more medical work in the form of attendance that is not at present being given. For this, as well as the rest, he proposes to pay by creating a fund from provident payments of the beneficiaries, extended by grant from the Treasury, and we may take it for granted that he is pretty well informed as to the existence of several ways in which he can secure the service required. As he is entitled to assume that a registered practitioner is both adequately trained and honest enough to carry out this work, any scheme that will give him a supply of registered practitioners is sufficient for his purpose, and we must be provided with fairly cogent reasons and show due regard to the conditions under which he makes his grant if we are persuade him that the system which commends itself to the medical profession is preferable to that of a medical civil service which is being strongly advocated from certain quarters, or to an extended medical service through the friendly societies.

Let each of us try to imagine himself conducting an interview with the Chancellor on behalf of the profession, presenting such arguments as we can, for the Treasury taking each year the margin, large or small, left after the contributions of workman and employer are exhausted, and meeting his arguments as to the impropriety from a national point of view of dealing in such an incalculable way with the Budget. If we do there will be few of us who do not realize that the Treasury grant will be made per head as well as the contributions of the beneficiaries themselves and that of the employers. The problems before us are, therefore, the adequacy of the fund over a series of years, and the way it is to be distributed in relation to the work of each doctor. Adequacy of the fund—or, in other words, the full market price of medical

work—can only be secured by common action, and I have no hesitation in assuring Dr. Gough that I answer my own question in the affirmative, and that if the decision of the Association or the profession should, in my opinion, be unwise, I should use my endeavours to get it revised within the Association itself.—I am, etc.,

Dundee, Nov. 12th. R. C. BUIST.

STATE SICKNESS AND INVALIDITY INSURANCE.

SIR,—I am entirely at one with Dr. J. H. Taylor in his letter in the BRITISH MEDICAL JOURNAL, November 12th, 1910, in regretting any tendency towards "dividing the Association into two hostile camps on the question of payment of fees under State sickness insurance." It would, of course, be infinitely preferable for us all to be united, at least on fundamental points, before we officially approach, or are approached by, the Government, and I would most strongly urge that every effort should be made to arrive at agreement by a calm and candid discussion of all aspects of the subject.

It cannot be expected, however, that the general practitioners of this country can regard with absolute indifference the prospect of their probable extinction in the near future, as may happen if some of the schemes which have been proposed should be adopted by the Government.

Personally, I am sorry the Gateshead Division has made a somewhat hasty decision, but I am not at all surprised, and I feel only too sure other Divisions, as well as many individual members, will quickly follow suit unless the Association takes immediate steps to ascertain the views of its members, and to frame its policy and action upon those views. I have very little doubt that when the issue of "payment per attendance versus payment per head" is put to the general practitioners of this country, there will be an overwhelming majority in favour of "payment per attendance"—that is, for work actually done—and against "payment per head"—that is, contracting for an unlimited amount of attendance for a fixed and limited fee per annum.

In my opinion the issue is a vital one, because it means that if we accept the latter method of "payment per head," we are taking upon our own shoulders the whole risks of the insurance. It would be we individually who would have to bear the brunt of all exceptional claims.

Now the whole basis of insurance is the principle of distributing the risks over so large a field that the exceptional elements can be practically disregarded, but to ask each individual practitioner to undertake the risks of insurance for his relatively small *clientèle* is to offer him a veritable gamble; he may, of course, have a number of clients who would not require his services, but if he is a successful practitioner it is more than likely that the demand upon his time and services would be above the average—and yet his pay would not necessarily be proportionate.

If the Government intend to introduce a system of State insurance for sickness and invalidity, to include medical attendance, they have no right to expect or to ask the medical profession to undertake the risks as well as to do the work, and we shall be very foolish if we allow ourselves to be trapped into doing so.

To take a concrete case—an extreme one no doubt, but by no means an impossible one—suppose a workman's insurance contributions have been paid regularly to Dr. A. for ten years but the doctor's services have never been required. Two days before the end of the year, when a fresh choice of doctor is allowed, the workman is attacked by pneumonia. Dr. A. is sent for but does not, for some reason, give satisfaction to the patient or his family. The day when a change can be made arrives, and Dr. B. is promptly sent for. The case proves a very severe and protracted one; Dr. B. attends perhaps half a dozen times a day for a week or two, and does his best to pull the patient round, but the man dies. How is Dr. B. to be remunerated under the capitation system? Or, again, the patient, instead of dying at once, develops phthisis, and Dr. B. is let in for almost daily attendance for the next twelve months. Can Dr. B. feel that his work is being fairly remunerated when he learns that Dr. A. has been receiving this man's contributions for ten years or more, and has done nothing in return; whilst he (Dr. B.) has to be content for all his arduous service with a nominal payment per annum? It will take a good many non-sick payers on his list to make up to him for this.

It has been said that there can be no objection to payment per head provided the payment be adequate—that is, so as to allow of a reasonable fee per visit—and that it is a simple matter of actuarial calculation to say what the fair capitation fee should be. This is, I fear, begging the whole question. It would only be possible to fix a fair capitation fee when the incidence of sickness is fully known. There are no data at present for ascertaining this, and it is practically certain that the capitation-fee offered by any Government would *not* be adequate. Again, as I have pointed out, even if a fair average fee could conceivably be arrived at for the whole country, it is pure chance, under the capitation system, whether any individual practitioner gets his fair share of actual earnings; indeed, it is practically certain that the busy and conscientious practitioner would be penalized and underpaid, whilst the shirker, who went about it in a diplomatic way, would draw more than his just share of fees.

The possible abuses of the contract system are, indeed, only too many and too well known to need reiteration, and the general experience of the profession both here and abroad is strongly opposed to its continuance.

Dr. Taylor says, let us try first for "payment per attendance, as most likely to give the most efficient medical service, satisfactory both to the public and the profession." Failing this, he suggests "we should accept payment per head from the insurance department under the Provident Medical Service scheme drafted by the Special Poor Law Committee." Now this seems to me tantamount to saying, when we have a case of diphtheria to treat, "we know antitoxin is by far the most efficient treatment, and most satisfactory both to the patient and ourselves," but if it be objected by the parents or guardians that antitoxin is "too ideal," or "too expensive," we will meekly "consent to treat our patients on the old lines," that is, without antitoxin. If we are not allowed to treat our patients in the way we think best we should decline to attend, and similarly if the Government does not allow us to treat our patients under State sickness insurance in the most efficient manner we must decline to attend them, in the patient's interests quite as much as in our own.

The Provident Medical Service scheme drafted by the Special Poor Law Committee was originally intended to deal with cheap club practice—that is, to remove some of its more obnoxious features; but even with these amendments the scheme is still essentially club practice, its object being to obtain medical men's services at the cheapest possible rate, by contracting for a limited and fixed fee for a practically unlimited liability for sick attendance. It is this unlimited and quite incalculable amount of attendance to which we should be committing ourselves that makes the bargain so unfair to the individual practitioners. If our work is to be adequately remunerated, there is no need for such a provident scheme. If, however, the Government seek to exploit us by offering us less than a just and proper reward for our services, and also to thrust on our shoulders all the insurance risks, then I say *they* are not giving the workers of this country State sickness insurance, but they are wringing it from the already overwrought and overburdened medical practitioners, upon whose shoulders the chief cost would inevitably fall.

To allow for one moment that we shall be willing to accept contract practice, *on any terms*, is to give our whole case away. To say "that the Government will never agree to payment for work done," and therefore we shall have to accept contract work, is to deny our right to have any voice in the disposal of our services. Surely if we are to do the work we should be consulted as to the terms upon which we will act; and we have a right to ask that our remuneration should bear a very definite relation to our exertions. We should therefore use all efforts to secure payment for work done at a just and reasonable fee per attendance (as is now charged in private practice), and resist by every means in our power the imposition of an unfair and inequitable contract system, if necessary declining to act under such a system.—I am, etc.,

Bowdon, Nov. 12th. P. R. COOPER.

SIR,—So much misconception appears to prevail as to the aims of those of us who object to clubs, provident societies, and all "schemes" for attendance on the State

beneficiaries, that I crave space to introduce to your readers the simile of fire insurance, to which medical attendance insurance is closely analogous.

The present method of fire insurance companies is regarded as fairly satisfactory both by the insured and by tradesmen in general, and we objectors to contract think that medical attendance insurance should be run on the same lines. These lines are that the insurance company bears the risk of loss by fire, and the tradesmen make good the loss at market price. Fire insurance, if run on the lines of a provident medical service, would turn out thus: The fire company receives a premium and guarantees against loss by fire; it then hands this premium over to a builder, and says: "Now if this house is burnt down you must replace it."

This is exactly what is done to-day by the friendly societies in regard to medical attendance risk, and what is proposed to be done by the British Medical Association to-morrow. Only, the Association says: The friendly societies had no interest in exacting from the insurers an adequate premium (capitation grant), as they could force the doctors to take an inadequate one, but we, the Association, will take an interest in getting an adequate premium for the sake of our members, and this is "the great and fundamental difference that places the two systems in totally different categories." *En passant*, one may observe that the Association does not explain how it is going to get a bigger (adequate) premium while the friendly societies are accepting a lower (inadequate) one. But *does* it place these systems in different categories? We abolitionists say No. Let us follow the lines of fire insurance, which guarantees replacement of goods destroyed by fire, holds itself responsible for the damage, and repairs that damage *when it occurs* by either paying in cash direct to the insured, or paying the bill of the tradesman who replaces the goods. Why with medical attendance should any other course be followed? Why should the State, for example, ask us medical men to underwrite the insurance risk it proposes to accept for the premiums of its beneficiaries? This is the point on which we differ from Dr. Buist and the majority of our representatives at the annual meeting. I had thought that we differed from Dr. Greenwood also, but in the Journal of November 12th he makes it evident that he had misconceived the position of these "medical reformers who publish impossible schemes." We have no "special scheme of medical attendance" in the sense he means. Our "scheme" is a proposal that when the State buys a thing it should pay for it in the ordinary way in current coin. The State is the insurance company guaranteeing medical attendance to its beneficiaries; it may either pay the insured sufficient during sickness to enable him to pay the doctor he calls in (this Dr. Greenwood says he would approve of) or give the insured the services he requires, paying these services itself (like many insurance companies, which will give their insured a new carpet in place of one destroyed, but not the *price* of the carpet). This action of insurance companies is a quite usual and, I think, reasonable one, and I cannot see why Dr. Greenwood should object to the State's imitating it in the more important matter of medical attendance. The fire company has no patriotic or humanitarian interest in seeing that the man whose house is burned down spends his insurance money in building another; the State has a direct interest in seeing that the sick man does spend his insurance money on the object for which it is furnished, in order to get well as quickly as possible.

How Dr. Greenwood can say that our proposals "would force the poor people to give up their own private doctor or club and make use of the doctor whom the scheme provided," when the scheme provides no doctor and is directed absolutely against the nomination of special doctors, I do not understand. I feel that he is fighting an imagined idea very different from the one we stand for. I cannot too plainly and emphatically say that if our proposals are received by the Association and by the Government, no patient will give up his present medical attendant unless he urgently desires a change; and no medical man will fail to gain in pocket, leisure, and self-respect unless he owes a present competence, not to his merits, capacity, or popularity, but to unfair constraint of his *clientèle*. Personally I believe there are no such men; but it has been reiterated that if the workers were given freedom to choose what doctor each liked, the "works doctor" would have no patients left to him—a scathing commentary on the quality of club practice!

I said, "if these proposals for the restitution of private practice are received by the Association and by the Government." Will the Association be too timid or too lethargic to make a stand? That is really the vital question, for if the Association wants freedom it is the master of the situation. What would not the cotton-spinners or boilermakers give for our unique and impregnable position? They have to contend with starvation whilst out on strike, and with blacklegs at home and abroad; our pay goes on while we are fighting, and we have no blacklegs outside our own profession. Government cannot send to Belgium for a few weeks' medical services while it is fighting our demands.

Let every Division in the country discuss this question at length—every night for a week, if necessary, for it is the most important matter the profession has had to deal with for a century, or will have for another—know its own mind, consolidate with the medical men outside the Association, or, better still, with this bait persuade them to join, and stand firm by the result of the Divisions' voting on the Special Poor Law Reform Committee's report, which will soon come to the Divisions for consideration. In spite of Dr. Gough's suspicions, I believe that our leaders are anxious to fight for whatever the Association is united enough to demand. We demand that our private patients be not interfered with in their relations to us. Let Government confer benefits on them if it likes, but not at the expense of our incomes and personal freedom. By all means give the wage-earner medical attendance, but pay for it in the ordinary way at ordinary fees. This, besides being best for us, is best for the people and best for the science we serve; it will preserve our freedom of practice, keep active that competition our nation so admires, satisfy the State beneficiaries, relieve the congestion of hospital out-patient departments, solve the question of the treatment of school children, and make possible the exaltation of medicine into a profession instead of, as it is fast becoming, a trade.

Further, if we believe that in the interest of medicine and of the nation the continued existence of the general practitioner is preferable to his transformation into an "institution doctor," it is our *duty* to the profession and to the State to urge this course on the Government, even if we think it will not hearken. If Government is determined to make a mess of this business, let it do so without our co-operation or acquiescence.

I do not quite understand Dr. Williams's provisional approval of a system of piecework "if adequate security that the funds would never run short, could be obtained"; how can the funds run short unless the insurance company (the State) "contracts out" of its liability by imposing a capitation scheme on the medical profession? Then, indeed, the funds might run short and the deficit have to be supplied by us unfortunates.

This is one of our arguments for "piecework" as against contract: that the liability is the State's, and contract transfers that liability to us. There is a tendency to gloss over the other arguments against contract, and nullify this one by suggesting that we could, by insisting on a large enough capitation grant, reduce the insurance risk to a vanishing point. Even if this could be done (and I believe it will be found more difficult than to abolish contract altogether), all the intrinsic demerits of club practice remain—the suspicious attitude of patient to doctor, and vice versa, the grievances of overtime and unreasonable hours and additional duties, of being tied for a period, and so on. And why should we worry to tinker at a faulty machine when a really efficient one is waiting to be put in use, if we have the courage to insist on the old one's being scrapped?—I am, etc.,

Bristol, Nov. 12th. HARRY GREY.

THE REFERENDUM.

SIR,—I do not desire to intervene in the correspondence on sickness and invalidity assurance, but I am reading it with much interest. My object in writing just now is to draw attention to the suggestion made by Dr. Ernest Milligan in the Journal of November 12th. He says:

A postal referendum to all members of the medical profession, having a set of questions similar to those proposed by Dr. Fothergill, would give a true idea of the opinions of medical

men in this country. Such postal referendum should be carried out, and a chance given to general practitioners to express an opinion on this vital question—*for to attend meetings is an impossibility with many.*

The italics are mine.

There could hardly be a better object-lesson in favour of the views so recently expressed and still held by a number of Branches and by many members of the Association.

Let us hope that the powers that be will recognize the truth of Dr. Milligan's statement, and that we may yet find the "postal referendum" adopted in our new constitution. Why should practitioners in the Association be disfranchised any more than practitioners outside the Association?—I am, etc.,

Edinburgh, Nov. 15th. R. MCKENZIE JOHNSTON.

ALCOHOLISM AND DEGENERATION.

SIR,—All readers of the editorial in your last issue in relation to the above subject will be glad that you are not prepared to express a final opinion on the subject of parental alcoholism and degeneration with which Professor Pearson and Miss Elderton's memoir ostensibly dealt, and, above all, will be relieved to learn that our JOURNAL is not yet committed in support of Professor Pearson's and Miss Elderton's verdict, because that verdict has no scientific relation to the problem, What physical injury is done to the children of the nation by parental alcoholism? It certainly is not yet the time for the medical profession to endorse or deny the validity of any investigations on this question by Professor Pearson or Miss Elderton. That time will arrive when these workers have addressed themselves to the question which was the object of their investigation, namely, "The influence of parental alcoholism on the physique and ability of the offspring."

Up to the present, however, they have not done this.

They do not yet know whether the individuals about whose habits (alcoholic or not) they wrote were, *qua* parents, alcoholic or not.

As Mr. Keynes, Dr. Sullivan, Dr. Saleeby, and others have pointed out, Professor Pearson and Miss Elderton omitted to ascertain in their research the answer to the essential question: Which came first in each case, the alcoholism or the child?

Professor Pearson's only reply to this criticism is that, "*if some* children were born before parental alcoholism had started *some* were certainly born after."

On this "*if*" and on these two "*somes*" Professor Pearson and Miss Elderton have based a mass of figures and mathematical curves which they presented to the world as a model of scientific caution and accuracy, the alleged absence of which in other inquiries they assert in the words of admonition with which they introduce their memoir to the public.

On what ground you refrained in your editorial from drawing attention to the fact that Professor Pearson's admission wholly destroyed the scientific value of his and Miss Elderton's mathematical results we do not know, nor do we understand your reason for satirically animadverting on Mr. Keynes's plain statement of fact that "as a contribution to the solution of the general problem the memoir is almost valueless, and from its failure to direct the readers' attention to essential facts, absolutely misleading."

We feel, however, obliged to call special attention to this matter on account of its great scientific and public importance, and in doing so to enter a remonstrance against your unsubstantiated comment, namely, that not the authors of the memoir but "their critics appear to have been somewhat over-hasty."

Our JOURNAL is designed by the Association to be a scientific periodical. We submit that to treat such a question as alcoholism and degeneration editorially, and to give support to those who have offered to the public as scientific, conclusions which are admittedly based on mere conjecture, shows that you yourself have been "over-hasty" rather than the scientific critics you condemn.—We are, etc.,

London, W., Nov. 13th. MARY D. STURGE.
VICTOR HORSLEY.

CORONERS' LAW AND DEATH CERTIFICATION BILL.

SIR,—In your issue of October 1st there appeared an excellent letter by "Another Country G. P.," under the above heading. He suggested that the profession should combine in each constituency and memorialize its member of Parliament.

It may be of interest to inform you that here in the Enfield Division of Middlesex this has been done. With the very able assistance of my friend and colleague, Dr. Haldane Cook, a memorial has been submitted for signature to practically every medical man in the constituency, and in no single instance has it been met with a refusal. The last sentence of the memorial is as follows:

> We therefore venture to hope that when the bill comes up for consideration in the House of Commons, you will use your influence to see that an adequate fee is guaranteed by the State for each certificate.

Just to show what a little perseverance will do, over eighty medical men have signed the memorial in less than three weeks, and it has been forwarded to, and been favourably acknowledged by, our M.P.

My only object in telling you this is that if you care to publish it, it may be the means of causing many other members of Parliament to be memorialized to the same effect, and thus may help to procure for our profession what is, after all, simple justice.—I am, etc.,

Enfield, Nov. 14th. HOWARD DISTIN, M.B.

THE AFTER-CARE OF CONSUMPTIVES.

SIR,—I trust you will allow me to supplement your short account of what I said at the Charity Organization Society meeting on November 4th,[1] since in its present form it may be misleading. It states: "There was no danger of infection unless the phthisis were in active stage, or proper care were not taken." I intended and stated that this applied only to patients who were sent back to their former work after treatment in a sanatorium or hospital. Necessarily such patients are not in an active stage of the disease, for otherwise they would not be advised to undertake any work at all. In many cases, when discharged, they have no expectoration. But most important of all is that in every well-ordered institution the patients are thoroughly trained by lectures and otherwise in the methods for prevention of infection.

No sensible physician would assert that untrained patients were, in any stage, safe companions.—I am etc.,

London, W., Nov. 14th. ROBERT MAGUIRE.

PROFESSIONAL WOMEN AND MATERNITY.

SIR,—In his evidence before the Divorce Commission Sir James Crichton-Browne made the following statement:

> The rebellion against maternity was most marked in these classes of women, who asserted their independence and equality with men. For the ladies of the law, and for medical and journalistic ladies, maternity was a nuisance.

Now, I am writing to ask if Sir James Crichton-Browne will kindly give us his authority for this statement. Will he tell us how many ladies of the law have expressed this sentiment, and also give us some evidence which goes to show that the same opinion is held by medical and journalistic ladies?

Personally, I have never met a legal lady (has Sir James?), but, either as patients or friends, I am acquainted with a large number of women belonging to other professions, many of whom are married and mothers of families, and neither from married nor single have I ever heard the statement that they considered either marriage or maternity a nuisance.

At the same time, Sir James pleads for the idealizing of marriage. What is more destructive to this than the marriage of convenience, which in so many cases is unavoidable unless the woman is independent? As the majority of parents are unable to provide a competence for their daughters, this independence can alone be secured by educating them for some definite vocation.

This position of affairs does not affect the woman only. Is not a very grave injustice done to the man who is accepted in marriage because he is able to provide a wife with the material necessities or luxuries of life, not because he has inspired in her that feeling towards him which alone can sanctify their union? Then, again, the fact that in Great Britain there are so many more women than men renders the following of some profession or occupation not

[1] BRITISH MEDICAL JOURNAL, November 12th, page 1534.

a matter of choice, bnt an imperative necessity forced upon them by the need of the means of existence.

These are the causes which are at work in forcing women into other spheres than the matrimonial, not their desire for equality for men. The more these conditions are attained—which, although lessening the actual number of marriages, will increase the number of those founded on mutual affection—the less we will hear of the Divorce Court and its sordid details.

If Sir James wishes his evidence to carry any weight or conviction with it, he will, no doubt, be ready to show that his conclusions have been formed from well-authenticated facts. If he does not do this, the public will be forced to the belief that this is another instance in which he has again merely been "hazarding a conjecture."—I am, etc.,

November 8th. A Woman M.D.

THE NUMBER OF CHILDREN PER FAMILY.

Sir,—When I proposed that bachelors between certain ages should be taxed, and that the amount so raised should be given to those whose income is under about £250 per annum and who have the largest number of healthy children, I was no little surprised that it is impossible to obtain from the Census, or Registrar-General, or Local Government Board any statistics whatever showing the number of children per family. This is not as it should be. That fine man, the late Dr. Matthews Duncan, in his Government report on "Fertility, Fecundity, and Sterility," did supply some such statistics. The Registrar-General kindly tells me that the Census of New South Wales contains similar statistics.

May I suggest that a committee of the British Medical Association be appointed to offer suggestions to the Census Commissioners, and especially that relating to relative fertility? It would be well if such Census statistics gave also the ages of fathers and mothers and the age of each child last birthday. The Irish Census gives some very instructive figures relative to the deaf-mutes in Ireland: their number and their place-birth in the family—that is, first, second, third, etc., child.—I am, etc,

Liverpool, Nov. 13th. Robert R. Rentoul.

DR. HADWEN AND THE "CRIMSON CROSS REMEDIES."

Sir,—I beg to thank you for your courtesy in publishing my correspondence with Dr. Drury upon the above subject in your issue of November 12th, although I was very much surprised to see it in your columns five months after it had taken place.

I gather from your own preliminary remarks that "Dr. Drury has delayed submitting this correspondence in the hope that Dr. Hadwen might reply to his second letter repeating the request for particulars of the investigation advertised as having been undertaken by Dr. Hadwen."

This is a very extraordinary statement. Dr. Drury asked me on June 5th for "any details" I could furnish concerning the "Crimson Cross remedies," which he said "I should be glad to publish if you would allow me to do so." He enclosed me a cutting and also a reprint from the British Medical Journal, neither of which, owing to my absence abroad, had I previously seen; nor had I seen, nor have I seen up to the present time, the advertisement to which allusion is made, wherein, I gather, my name was quoted as an authority for certain statistics.

In my letter of June 13th I gave Dr. Drury all the information which lay in my power, including a summary of the particulars contained in my casebooks, and I invited him or any one else to give me a call and inspect the books for himself.

Dr. Drury distinctly declared in his letter of July 10th that he should not publish my reply. He said it "did not provide him with particulars for the benefit of medical officers of health," and construed my letter into "an indirect attack upon the British Medical Journal"; and why he has now offered the correspondence to you for publication, after this long interval, passes my comprehension. He makes, as your readers will perceive, a running commentary on the various points in my letter without bringing forward a single issue which I have not already answered. I could not see then, neither can I see now, anything in Dr. Drury's letter of July 10th which calls for a reply.

I have been perfectly open and straightforward in this matter. In the letter you have courteously published I have given the fullest answer possible to the question addressed to me, and I repeat that if Dr. Drury will care to call upon me or appoint any one else to do so my books are open to inspection, and I shall be happy to give all the explanation which lies in my power; any extracts whatever may be made from them, and any details which may be deemed suitable for publication or criticism may be used for that purpose. Most of the details have been checked by myself, and I hold myself responsible for them all. More than this, every unprejudiced reader will agree, it is impossible for me to do.—I am, etc.,

Gloucester, Nov. 14th. Walter R. Hadwen.

MASSAGE OF HEART IN CHLOROFORM COLLAPSE.

Sir,—What is practically a sense of duty makes it incumbent on me to publish the following notes at the earliest possible date, since the description of that which was the means of saving one life may suggest to your readers the possibility of similar success under like circumstances. The case is as follows:

A. C., aged 30, marine engineer, had at least one fairly sharp attack of appendicitis, and, seeing that he consulted me in the quiescent stage of his malady; that he had the necessary time to spare; that he was liable to further attacks in future, when he might be placed at the advent of an attack twenty or thirty days from land, I advised, and he agreed, that his appendix should be removed.

Physical examination, which was minute, revealed nothing whatever wrong with his heart or kidneys or other organ. He was a stoutly-built, pleasant, jovial fellow, with most splendid muscular development, but—and this, I take it, is a very important feature—he had the most ineradicable dislike to, and fear of, "chloroform," by which he meant anaesthesia in general, though he had had no previous experience. It amounted to an obsession with him, and he continually dwelt on this matter.

He entered Richmondhill Nursing Home on the evening of September 23rd, apparently the soundest man possible, and went straight to bed, where he remained till the day of his operation—the 26th, at 3.30 p.m. He entered the theatre and mounted the table with alacrity, but still with the same dread, and began to receive chloroform from a skilled anaesthetist. All went well for about four minutes, and he was just "under." I was about to commence and had my scalpel in hand, but before I touched him he suddenly collapsed, breathing stopped completely, and so did his pulse; which was first to do so I do not know. He was at once inverted and artificial respiration, rhythmic tongue-traction, hypodermic injection of strychnine and of ether tried—all to no purpose whatsoever. I massaged the heart outside over the precordium and in the left hypochondrium, and failed to get any response. His pupils were dilated, so that there seemed to be no iris left; no pulse at wrist, temple, or groin. He was dusky and clammy, and every individual present concluded that all was over, and some said as much.

I then ceased the massaging from the outside, and was divided for a second as to whether I should try heart puncture or direct massage. There was no suitable trocar for the first procedure, but plenty of knives, etc., for the second. I therefore cut into the abdomen to the left of the xyphoid cartilage, making an incision about 4 in. long down to the peritoneum, and wormed my right thumb through the wound and up through the diaphragm margin till I had it well behind the heart and the other fingers over the heart outside. I now began to squeeze, as one does the bulb of an enema syringe; and never shall I forget the kick and wobble, or rather thrill, that the heart gave in response to the very first compression. It reminded me of the feel a trout has when one grabs it below a bank or boulder. I kept pumping away, and all the symptoms disappeared, the first indication of revival being pupil contraction. The wound was disinfected and stitched up.

Now came the question of proceeding to remove the appendix or not. He looked so well, and was taking chloroform and ether mixed, that I decided to proceed,

knowing that after this "scare" I would never have another opportunity. The appendicectomy passed off without any incident, and was a most necessary operation. Subsequent recovery was excellent, and he left the nursing home this evening, twenty-one days from entry and eighteen from operation, and wonders what the upper wound was for.

Comment here is needless. All that can be said is that in the unanimous opinion of three medical men and of the nurses present he was dead. When is a man dead?—I am, etc.,

J. WALLACE MILNE, M.B., C.M., M.R.C.S.Eng., L.R.C.P.Lond.,
Senior Assistant Surgeon, Aberdeen Royal Infirmary.

VOLUNTARY AID DETACHMENTS.

SIR,—At the present time very many desirous of joining are deterred by the length of time required to pass in first aid and nursing or hygiene as separate courses.

A simple way out of the difficulty is a course of ten lectures and ten instructions in first-aid and nursing; at the end of the course those passing a suitable examination to be efficient members and allowed to commence training.

As these detachments are associated with the evolution of our system of national defence, being the technical reserve of the R.A.M.C.T., and entirely local, why not detail officers of the R.A.M.C.T. to examine, and the county association to grant certificates to the successful, and so effect co-ordination?—I am, etc.,

Bletchley, Nov. 11th. P. BROOME GILES.

PLAGUE AMONG EUROPEANS.

SIR,—There seems to be a general impression that plague could not possibly become epidemic among Europeans. As this is likely to lead to viewing the spread of plague-infected rats over different parts of the country with comparative complacency I send you the figures which I submitted to the Colonial Office in May, 1901, regarding the plague outbreak in Capetown two months before the last case:

Cases of Plague.

Europeans.	Coloured.	Natives.
164	342	133

Capetown with its suburbs was a comparatively small town. Rats had died a very considerable time before the outbreak, and when the epidemic began there were very few rats to be seen. The close connexion between rat plague and human plague was only accepted in a half-hearted manner until there was a succession of cases in which dead rats were found in the houses, and in one particularly which was badly infected, where 105 dead rats were found under the floor and behind the wainscot and panelling.

There is also another impression that plague behaves always in the same way and that because there was a small percentage of pneumonic cases in India and Capetown, whilst in Sydney there were until recently no pneumonic cases at all, that, therefore, a small percentage of pneumonic cases is a law of the disease. In 1908 on the Gold Coast there were both bubonic and pneumonic cases of plague, and instead of the 4 to 8 per cent. of pneumonic cases there was over 50 per cent.

Until England can deal effectively with her influenza epidemics she cannot afford to sit down and not deal vigorously with the plague-infected lower animals in Suffolk in the hopes that nothing may happen. She may be right; on the other hand she may be wrong, and the wisest course is to treat the rat plague as *the plague*, and bring every available force to bear to get it out of the land.—I am, etc.,

London, N.W., Nov. 15th. W. J. SIMPSON, M.D.

THE HEARING AFTER "OTECTOMY."

SIR,—In the LANCET of August 11th, 1906, may be seen (p. 354) the following paragraph:

> The paramount position which the radical operations hold in the estimation of otologists is a tacit acquiescence in the opinion that chronic suppuration of the middle ear is generally considered to be incurable by any other means.

This is from an article by Mr. C. Heath. In the same article he refers to his paper on "The Restoration of the Hearing after Removal of the Drum and Ossicles by a Modification of the Radical Mastoid Operation." It is strange, then, to find Mr. Heath arguing that removal of the membrane and malleus inevitably leaves a deaf person.

I should be pleased to show Mr. C. Heath a case in which the hearing is very good indeed after such a removal. Furthermore, Sir, I am prepared to furnish you with the names and addresses of all the patients I have treated for suppurative otitis by otectomy during the past two years and a half. A study of these cases will show that this method of treatment is conservative of the hearing and satisfactory in its results.—I am, etc.,

London, W., Nov. 14th. F. FAULDER WHITE.

ALCOHOL AND OXYGEN.

SIR,—I should like, with your leave, to offer a few remarks on the apparatus to be employed in the administration of alcohol vapour. The apparatus which I have designed is capable of delivering either oxygen alone or oxygen with alcohol of such concentration as is desired. Since there is only one tap, the apparatus is extremely easy to manipulate.

If alcohol administration is required in an operating theatre or elsewhere, it is usually an emergency that calls for it. This is the foundation idea of the apparatus. It is intended to be permanently attached to the oxygen cylinder, so that when alcohol is required it can instantly be given without the delay involved in the adjustment of rubber tubing which the use of a wash-bottle necessitates. The importance of immediate treatment in cardiac failure can scarcely be overestimated.

Messrs. Burgoyne and Burbidges, of Coleman Street, E.C., are supplying the apparatus.—I am, etc.,

B. J. COLLINGWOOD,
Professor of Physiology, University College, Dublin.
November 13th.

PROVISION FOR THE INSANE POOR.

SIR,—A paragraph appeared in the April number of the *Journal of Medical Science* commenting on the lack of provision in county asylums for patients who are just above the ordinary pauper class. I would wish to point out that at this new asylum we have made provision for the class who cannot afford to pay the fees of a private asylum; it is chiefly confined to cases belonging to the two counties of Leicester and Rutland, but I am empowered to take in cases belonging to other counties to the number of five males and five females at the rate of 30s. a week. Perhaps the insertion of this in the JOURNAL might be of use to medical men who find a difficulty in finding accommodation.—I am, etc.,

ROTHSAY C. STEWART,
Medical Superintendent, Leicester and Rutland Asylum.
Narborough, Oct. 21st.

STRANGULATED OMENTAL HERNIA WITH FEW SYMPTOMS.

SIR,—In answer to Mr. Rushton Parker's kind comments on my case reported on November 5th, I should like to state that the omentum was black, or so dark as to be called black. If by necrosed Mr. Parker means broken down and offensive, it was not so, and there was no gradation of tints; it was uniformly black, only a very narrow portion next the transverse colon was a proper colour, enabling me to ligature the omentum off. I have the entire specimen very nicely mounted, and to-day its colour is dark red with a bluish tint, only a small portion at the point where I ligatured is a normal colour.

Whether it was actually a state of gangrene or obliterated circulation leading to gangrene is only a question of degree. The condition had lasted four days, and I still maintain my point—which Mr. Parker has not commented on—that the gangrene started with the hernia becoming strangulated, and that the gangrene in these cases is capable of passing along the omentum past the stricture to the inside of the abdomen, which is not the case as regards strangulated bowel, and I do not find any record of this surgical point in the textbooks.—I am, etc.,

Wallington, Nov. 14th. A. Z. C. CRESSY.

DRAUGHTS.

SIR,—My lot being cast in a land of hotels, I pursue my calling in a medium permeated by draughts and rumours of draughts.

The *hotelese* for draught is "courant d'air," an expression originally derived from the French. Unlike bridge, golf, and theatricals, which engage the attention of sections of the community, the "courant d'air" is a subject of universal interest. It is also a perennial of hardy growth, but like members of the bar it takes a long summer holiday, and returns to serious work only when the hotel-keeper starts the central heating, and issues general orders to close all the port-holes and batten down the hatches, for "what is the use of heating the hotel if you are going to let all the heat out?"

Then the "courant d'air" assumes its garb of war, and the rest of creation ranges itself in battle array "for" or "against."

Like the warrior at the siege of Troy, the cold air without is ready to take advantage of every chance breach in the line of defence, and rush in, supported by an ardent band of followers, whose war cry is

Air, fresh air!
For draughts, one jot, we do not care!

The besiegers are met by a garrison of argus-eyed veterans, who rally to the cry of "courant d'air" as a terrier springs to attention at the cry of "Rats." To them the "courant d'air" is a thing in itself loathsome and hateful, like Polyphemus:

Monstrum horrendum, informe, ingens cui lumen ademptum.

The battle wages hot and furious, but whichever side claims the victory, the issue is the same, for it does not depend on a just assessment of the rival claims, but on the high price of coals about which all are agreed.

It is needless to say that the voice of the "courant d'air" party prevails over that of the advocates of fresh air, and all alike are sentenced to breathe impure air, for the maintenance of a high temperature without draughts in an inhabited room is inseparable from an impure state of the air in such room.

Dr. Sutherland's definition of draught is a decided improvement on the "concentrated dose of fresh air" of an earlier contributor; but I do not think it allows sufficient latitude for the variability of the human factor in the equation. It is extraordinary to what a degree of sensitiveness to the slightest air current the man, trained from infancy to beware of draughts, can attain.

But there is a constitutional as well as an acquired sensitiveness to draughts, and under this head I must express a divergence of opinion from the postulate set forth in the concluding lines of Dr. Sutherland's letter—namely, that because a tuberculous patient weakened by profound systemic intoxication derives benefit from prolonged exposure in the open air, therefore similar conditions are devoid of danger to those in health. My experience leads me to regard the tuberculous patient as highly tolerant of cold and exposure, more so than the average healthy individual, and far more so than he of rheumatic diathesis.

Failure to recognize this general rule probably explains much of the divergence of opinion on the subject of "fresh air." All are not equally susceptible to cold, and the least susceptible is the tuberculous, whereas it is assumed *a priori* that he is the most so.

May I, as one who has observed for many years the regularly recurring contests between the advocates of fresh and of foul air respectively, point out a merit on the foul air side which even its advocates have apparently failed to recognize.

Suggestive of paradox, it nevertheless contains a vigorous germ of truth that the individual who can live and thrive in a foul atmosphere must, *ipso facto*, be of greater resisting power than he who is dependent on fresh air for his well being. It must make a greater demand both on his breathing capacity and on his powers of resistance to infection. It is both a developing and an immunizing process, hence it makes him better able to resist both cold and infection. So far as my observation goes, this is actually the case. The *habitué* of the overheated and foul atmospere of the public smoking-room or salon is no less able than his fresh air-loving neighbour to withstand extreme cold or to undergo great physical exertion and no more prone than he to infection.

It is essentially the weaklings who are dependent on fresh air for their well-being, and of the weaklings the most dependent on it are the tuberculous.—I am, etc.,

Montreux, Nov. 8th. STUART TIDEY, M.D.

SIR,—I am glad that my small contribution on the subject of draughts has been productive of so many letters on the subject, and I should like, with your permission, to make a few additional remarks. Draughts of air may vary very much in velocity.

Dr. Sutherland, quoting Notter and Firth, gives their definition, namely, that any movement of air at a greater rate than 3 ft. per second is a draught. This cannot, then, be the draught to which Dr. H. Torrence Thomson refers as acting quietly and imperceptibly so that the person may be hardly conscious of it at the time.

It is evident, then, that a draught must be, as I have before stated, "a more or less concentrated dose of fresh air." In the majority of cases it is fresh air as it is caused by a window being opened to allow fresh air to enter into a room which contains heated and vitiated air.

Draughts may be prevented to a very great extent, as your correspondent, Dr. Sutherland, points out, by efficient ventilation, and where unavoidable their unpleasant effects can be prevented by simple means within the reach of the poorest. Sheets or blankets can be made with layers of newspapers, perhaps the best use to put them to. The effects of any draughts along the floor can be prevented by merely putting the feet on a piece of wood, etc.

As a correspondent points out, one may be exposed on a mountain to air currents moving at a high velocity, which few would consider to be draughts, yet in its character of producing strong currents of air cannot be distinguished from them. It is well known that those whose occupations keep them in these atmospheres are amongst the healthiest of the population.

If architects, the constructors of tramcars, etc., would pay more attention to efficient ventilation there would be no necessity for draughts; but, so long as they do not do so, it is better we should suffer the inconveniences of draughts of fresh air than be stifled in a poisonous atmosphere, stiff with the germs of all imaginable diseases. I agree with Dr. Thomson that the supposed ill-effects of a draught are due to the imagination—in the same manner that cures at Lourdes are.

A little while ago I went into a large public newsroom on a warm day. An old gentleman was sitting reading there. The door was closed, one window open a very little. I left the door open. He immediately said, "You have made me cough; there is such a draught." He was sitting at least 50 ft. from the door. What could that be but imagination?

I think it is pretty clear that the less one notices the presence of so-called draughts the less susceptible we shall be to any effects from them, whether real or imaginary.—I am, etc.,

Plymouth, Nov. 7th. GEO. JACKSON.

A CASE OF PEMPHIGUS VEGETANS.

SIR,—May I mention for Dr. Pernet's information that while the case described in the JOURNAL of September 24th was under Mr. E. Lane's care at the London Lock Hospital he was treated with an autogenous mixed vaccine of *Staphylococcus albus* and *aureus*? The effect of the vaccine treatment at first was so beneficial as to promise a complete cure. Relapse, however, took place, and though fresh vaccines in various dosages were tried, the patient retrogressed. On his admission, there were several large warty masses in the right armpit and on the left flank; these were soon got rid of by means of sulphur baths. The warty growths were crowded with spirochaetes for the most part intermediate in tenuity and closeness of spirals between the *Sp. refringens* and the *Sp. pallida*.—I am, etc.,

Cape Town, Nov. 7th. W. E. DE KORTÉ.

⁂ We have referred this letter to Dr. Pernet, who desires to thank Dr. de Korté for the interesting facts contained in his letter. He regrets he was not aware that vaccines had been employed at the Lock Hospital, or he would have mentioned the fact in his paper. He made use of the notes just as they were handed to him.

CAUSE OF APPENDICITIS.

Sir,—Dr. Coates suggests that appendicitis is caused by eating animal food in a state of decomposition. If such be the case, is appendicitis more common in the autumn months amongst that section of the community which consumes a considerable quantity of game? Has he *proved* that it is more frequent amongst those of the public who consume tinned meat? Has Dr. Coates or anybody else ever heard of a person becoming suddenly affected with appendicitis after a present, say, of a pheasant or a grouse has been duly eaten and enjoyed? such person of course not being in the habit of eating game of any kind as a regular article of diet. Again, is the decomposition of vegetable food—which, including fruit, is more likely to be eaten uncooked—to be entirely ignored?

No doubt Dr. Coates's list could be added to indefinitely, but there is another and far greater factor in the cause of appendicitis. That is, the imperfect or incomplete evacuation of the bowels allowing undigested food to remain in the alimentary canal longer than it should. Is constipation more common than it was? Has the increase in the number of cases of appendicitis anything to do with that? Take Dr. Coates's list, add to it all the indigestible, faked, and foolish things that are eaten to-day—I will not call them foods—and put in conjunction with them an incomplete evacuation of the bowel, and you will have the chief factor in appendicitis.

The strenuous life of the business and professional man of to-day, the hurried meals, and in some cases the daily sprint for the train, all help to prevent proper attention to digestion, and that which is far more important, the proper and complete evacuation of the bowels.

Equally injurious is the strenuous life of the present-day seeker after pleasure, women as well as men. Hurry and bustle and rush. The schoolgirl or schoolboy who comes down late for breakfast, and after a hurried meal rushes off on a bicycle, without attending to the bowels, is a frequent sufferer from appendicitis. The cramped position on the machine, undigested food above the appendix, and decomposition of many days' collection below—how can the appendix stand that?

Let Dr. Coates and others go on collecting so-called "causes" by all means, but let it be done in a systematic way; let every man who finds a cause support that cause by statistics, and we may get nearer the truth. "A great change in the food of the people during the last thirty years," says Dr. Coates, "and a great deal more appendicitis."

I do not remember ever having heard that one's ancestors refrained from hanging meat, or that they dined upon the pheasant they had shot the same morning. On the contrary, their saddles of mutton, their venison, and their game were, if anything, kept considerably longer. True, they did not eat tinned meat, and their flour was pure; but I believe they were exceedingly fond of a really ripe Stilton at Christmas.

As far as the food goes, the argument will not do. If appendicitis is more common than it was thirty years ago, or fifty years ago, or a hundred years ago, it is either because the condition was overlooked, or it is caused to-day by the effects of incomplete evacuation of the bowel and the rush and worry of modern life.—I am, etc.,

Symonds Yat, Oct. 29th. James Turle.

ETIOLOGY OF IRITIS.

Sir,—I have read with much interest Mr. Percy Dunn's letter which appeared in the Journal of November 12th, and more especially that portion of it which refers to rheumatic iritis, so-called.

In spa practice practically all cases of iritis sent for treatment are labelled rheumatic, but, according to my own observation, they are due, with few exceptions, to oral sepsis or gonorrhoea, the former outnumbering the latter by about 4 to 1, and the rapidity of recovery after the mouth and urethra have been treated is truly remarkable.

I am convinced that the connexion between recurrent iritis and suppurating teeth is exceedingly common, and has not received the attention it deserves.—I am, etc.,

Bath, Nov. 14th. T. Pagan Lowe.

Medico-Legal.

X-RAY BURNS.

A New Zealand paper, named the *Timaru Post*, which has reached us, contains a long account of an action for damages against a lay electrician. In the course of an attempt to take a radiograph of the kidney he produced a burn which after upwards of a year still remained unhealed. The electrician was a man who seems to be employed to do radiograph work at the Timaru Hospital, but when taking this photograph he was acting in a private capacity.

The allegation against him was that he had shown negligence and lack of skill by using too soft a tube, placing it too near the body, keeping in place for too long a time, and employing a coil with a spark too short for the purpose. The distance of the tube from the skin was said to have been only between one and two inches, and the length of the exposure twenty minutes; the coil apparently was ten inches long or less. The medical evidence for the plaintiff, mainly given by Mr. Clennell Fenwick of Christchurch Hospital, was to the effect that the defendant should have known that to use such a coil for the purpose and in such a way was necessarily dangerous, and he should also have discovered that his tube was too soft by testing it.

For the defence it was contended that the defendant had been using the same appliance for taking skiagrams for many years, and could not be expected to know that the tube had suddenly grown soft, because the general tendency of tubes was to grow hard. Various medical witnesses also stated on his behalf their experiences when studying at home, and indicated that until comparatively recent times long exposures were in use.

The case ended in a disagreement of the jury.

WORKMEN'S COMPENSATION ACT.

Cataract or Accident?

A case which shows the importance of the functions which a medical referee may have to discharge in relation to the Compensation Act was heard at the Liverpool County Court on October 12th. An engine driver claimed £1 a week from the London and North-Western Railway Company for total incapacity, due, he alleged, to an accident in August, 1909. The case was adjourned for a report from Mr. C. H. B. Shears, the Ophthalmic Referee in Liverpool under the Act.

The applicant, who is over 60 years of age, was driving a train, when he was struck in the right eye by a hot cinder or spark from a passing engine. It was alleged that in the result the vision of both eyes had been seriously impaired, and consequent total incapacity from following his employment as an engine driver.

The company paid him £1 a week from the date of the accident to May last, when they stopped the allowance on the ground that the effects of the injury had ceased.

Cataract was observed in both eyes in May, and the eye specialists, on behalf of the company, attributed this to the applicant's age and natural causes, and not, as suggested by the specialists on behalf of the applicant, to the accident.

It appeared that the man had been in the service of the company for forty-four years, and had such a good record that he had been one of their most trusted drivers of express passenger trains—so much so that he had been selected on one occasion to drive an express conveying the present King and Queen of England when they were Prince and Princess of Wales.

Mr. C. H. B. Shears, in his report, stated that he found slight but definite signs of cataract in the left eye and marked signs of cataract in the right eye. In each case he was of opinion that the cataract was the result of advancing years and not in any way due to the accident. He was of opinion that the applicant's present sight would not be sufficient to enable him to pass the vision tests required by the railway company for their engine drivers; but he still had very fair sight in the right eye and good sight in the left, and would be capable of doing work in other departments of the railway if that were available to him. His general condition seemed unusually good for a man in his years, and the cataract would probably develop very slowly indeed.

His Honour Judge Thomas, in giving judgement for the company, said he would like to say, having regard to the applicant's length of service with the company, and to the fact that he could still be of some service to them, that he hoped the company might be able to find suitable employment for the claimant.

The solicitor for the company said he would convey His Honour's remarks to the proper quarter, and he had no doubt effect would be given to them in such a way that the man's present vision would not be a source of danger to himself or any one else.

Refusal to go to a Convalescent Home.

In a case at Manchester it appeared that the applicant had been engaged at one time as a dirt picker by the Stafford Coal and Iron Company and had been in receipt of compensation at the rate of 6s. 1d. per week. The employers now applied that the compensation should cease on the ground that plaintiff's inability to work was due to his own misconduct in refusing to go to a convalescent home; and further, that he was able to do the work of screen picking, which was offered to him at a wage of 1s. 6d. per day for five days a week. It appeared that the

accident occurred on August 23rd, 1909, the youth's left foot being caught in a moving belt and the toe having to be amputated. The case came before Judge Ruegg a short time ago, when it was explained that his home was poor, and His Honour requested that he should go into a convalescent home with a view to getting strong again before returning to work. The company paid the expenses of the youth and his mother to the convalescent home and of a bed there for a fortnight, but the lad refused to go in "because he did not like it."

His Honour, commenting on the case, said it was obvious that the youth would not do anything towards regaining his strength. It would be very unfair if he compelled the employers to continue paying compensation under the circumstances. He would not go to a home to get well, nor return to light work. He would receive compensation up to date, but nothing more, and must return to screen picking or get nothing.

Sarcoma from a Fall?

An interesting appeal case was decided in the Court of Session on October 21st. A widow sued under the Workmen's Compensation Act for the death of her husband, and the Sheriff-Substitute found that he suffered injuries to his chest through falling, and that in consequence of these injuries he died. The employers appealed, and the court has recalled the judgement and found that the respondent was not entitled to compensation. In giving the decision the Lord President said that the Sheriff-Substitute's (Sheriff-Substitute Campbell Smith, Dundee) finding could not be supported on the evidence. He did not think it was proved that the deceased had a fall. But there was evidence to that effect, and accordingly he thought that if the only question had been, was there a a fall (that is, an accident)? a finding to that effect could not have been disturbed. He assumed also that the accident was in the course of and arising out of the employment. But then came the question, Was the injury (that was, the death) caused by the accident? Here the affirmer of that proposition must prove it, and here His Lordship found no evidence to support it. The evidence for the defence, including the very cogent evidence of the *post-mortem* examination, was absolutely destructive of the idea. Apart from that, the doctors who spoke for the respondent affirmed no such proposition. All they said at the utmost was that a fall might be the original cause of sarcoma, and that sarcoma might grow to the size here observed within a period no longer than that which elapsed between this fall and this death. They never said that in their opinion the fall caused the sarcoma which caused the death. No wonder they did not do so, for their own diagnoses ignored sarcoma altogether, and their certificates of death were absolutely inconsistent with death being the result of the accident. There was, therefore, nothing in His Lordship's view on which the finding of the Sheriff-Substitute could be supported. His Lordship had not, so far as his judgement went, considered the note which the Sheriff-Substitute appended to his judgement, as in his view it was improper to do so. If he were at liberty, to consider it, it bore on the face of it that, according to the Sheriff-Substitute's view, any disease which was developed during the ordinary conditions of a man's employment and culminating in death was, in the view of the statute, personal injury by accident arising out of and in the course of employment and causing death—a view so palpably unsound as to explain the possibility of such a finding as he had here pronounced on such evidence.

Lords Kinnear and Johnston concurred.

Loss of an Eye.

VERAX writes: A workman lost an eye six months ago, and has been receiving 8s. a week ever since. Now the company are anxious to offer him a "lump sum" in settlement of all claims. What would be a reasonable sum?

*** It would be impossible to answer this on the present data. The following are absolutely necessary for any solution of the question: (1) The workman's age; (2) the nature of his employment; (3) is the 8s. half his ordinary wages, paid to him under the Workmen's Compensation Act? (4) how much longer could he claim this payment if no arrangement is made? In some occupations the loss of an eye would be far more serious than in others. If it were possible to calculate the probable loss per week permanently entailed by reason of the accident, the "lump sum" should be equal to the amount necessary to buy an annuity commensurate with that loss, calculated on the workman's present age.

Medico-Ethical.

The advice given in this column for the assistance of members is based on medico-ethical principles generally recognized by the profession, but must not be taken as representing direct findings of the Central Ethical Committee, except when so stated.

"BOVRIL."

H. E. L.—Although we confess that the whole proceeding has a strange look we do not think that Trinity College, Dublin, can be blamed for the advertisement of which our correspondent complains. It certainly is to our mind a matter for regret that the Local Government Board for Ireland and the School of Physiology of Trinity College, Dublin, should have allowed themselves to undertake a report upon a trade product, and we are amazed that the authorities of the British Association should have considered the subject-matter suitable for a communication to one of its sections. The objection, of course, is that no manufactured article of this kind is necessarily of uniform composition, and that the statement which might be true of a given sample would not necessarily hold good of all.

Universities and Colleges.

UNIVERSITY OF OXFORD.

THE following dates are fixed by statute on which examinations will begin during the academical year 1910-1911:

First B.M.—Thursday, December 8th, and Thursday, June 22nd.

Second B.M.—Wednesday, December 7th, and Wednesday, June 21st.

D.P.H.—Tuesday, November 22nd, and Tuesday, June 6th.

Diploma in Ophthalmology.—Monday, July 17th.

Appointments.

The following have been appointed to hold office as examiners from the first day of Hilary Term, 1911, to the first day of Hilary Term, 1913: *In Organic Chemistry*, Mr. John H. Gardner. *In Materia Medica*, Professor Arthur Cushny. *In Human Anatomy*, Mr. A. P. Lodds-Parker. *In Physiology*, Professor Francis Gotch. *In Pathology*, Sir W. B. Leishman. *In Forensic Medicine and Hygiene*, Dr. F. J. Smith. *In Medicine*, Dr. Percy Kidd. *In Obstetrics*, Dr. G. H. A. Comyns-Berkeley.

The Vice-Chancellor and Proctors have nominated Mr. David Hepburn as Examiner in Human Anatomy in the First B.M. Examination, in place of Professor Arthur Robinson, who has been granted leave of absence.

Radcliffe Prize.

The next award of the Radcliffe Prize will be made in March next year, and candidates must hand in their memoirs to the University Registry on or before December 1st.

This prize, value £50, is awarded by the Master and Fellows of University College, every second year for research in either Human Anatomy, Physiology, Pharmacology, Pathology, Medicine, Surgery, Obstetrics, Gynaecology, Forensic Medicine, or Hygiene.

The prize is open to all graduates of the university proceeding to a degree in its Medical Faculty, provided that not more than twelve years have elapsed since they passed for the B.A., and that they are not Radcliffe fellows.

UNIVERSITY OF CAMBRIDGE.

THE following degrees have been conferred:

M.B., B.C.—A. E. Cullen, H. Parsons, G. W. Twigg.

M.B.—C. L. Forde, H. S. C. Starkey.

UNIVERSITY OF BIRMINGHAM.

The Walter Myers Travelling Scholarship.

THE Council of the University of Birmingham at its last meeting elected Mr. Cranston Walker, M.B., Ch.B., B.Sc. (Birmingham) to the Walter Myers Travelling Studentship, and Mr. Walker has proceeded to the University of Freiburg, in Baden, to carry out a research under the direction of Professor L. Aschoff.

This scholarship, which is becoming one of the most important in the medical school, is of the value of £150 per annum, and was founded by Mr. George Myers, of Edgbaston, for the promotion of original research, and in memory of his only son, Walter Myers, M.A., M.B., B.C.Cantab., B.Sc.Lond., a former student of Mason University College, who died of yellow fever contracted in Brazil while investigating the cause of the disease on behalf of the Liverpool School of Tropical Medicine.

The Council of the University also approved the election of Mr. John Dale, M.B., Ch.B., B.Sc. (Public Health, Birmingham) for a further year, he having held the studentship for the year 1909-10, and having proved himself a student of exceptional merit. Mr. Dale is returning to Hamburg to continue his research work in public health under the direction of Professor Dunbar.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

AN ordinary meeting of the Council was held on November 10th, 1910, Mr. H. T. Butlin, President, in the chair.

Examination Results.

Diplomas of Membership were issued to sixty-six candidates found qualified at the recent examination.

Diplomas of the Licence in Dental Surgery were issued to five candidates found qualified to receive them.

Examination Hall Buildings.

The tender of Messrs. Holland and Hannen for the sum of £27,644 for the building of the examination hall was accepted.

Bradshaw Lecture.

This lecture will be delivered by Sir Alfred Pearce Gould, K.C.V.O., on Wednesday, December 7th, at 5 o'clock, on the subject of "Cancer."

Vacant Examinership.

The President reported that Mr. Bruce Clarke's period of office on the Court of Examiners would expire in December next, and that the vacancy would be filled up at the ordinary meeting of the council on December 8th.

Annual Meeting of Fellows and Members.

This will be held November 17th, at 3 o'clock. The report of the council for 1909-10 will be placed before the meeting. Mr. Joseph Smith, J.P., will move:

> That this twenty-sixth annual meeting of Fellows and Members again approves the desirability of admitting Members to direct representation on the Council which (as now constituted) does not represent the whole Corporation; and that it does so in order that the constitution of the Council of the Royal College of Surgeons of England shall be in keeping with modern ideas of true representation.

Vote of Thanks.

A vote of thanks was accorded to Mr. C. B. Lockwood for a gift of books to the library.

CONJOINT BOARD IN ENGLAND.

AT a meeting of the Comitia of the Royal College of Physicians on October 27th, and of the Council of the Royal College of Surgeons on November 10th, diplomas of L.R.C.P. and M.R.C.S. were respectively conferred upon the following gentlemen:

W. A. Anderson, R. W. Annison, S. V. Appleyard, H. G. Baynes, B. Bernstein, G. C. Birt, A. W. Bourne, E. Boyd, E. G. S. Cane, W. E. Carter, A. E. D Clark, G. B. Cockrem, L. K. Cooper, J. Cowan, O. T. Dinnick, A. W. Donaldson, S. Falkner, W. E. Fox, A. J. Gibson, A. K. Glen, W. M. Glenister, E. St. G. S. Goodwin, F. C. Greig, A. K. Hamilton, H. A. Harris, A. S. Heale, A. J. Hickey, A. H. C. Hill, J. P. Hill, J. C. John, W. H. T. Jones, J. B. Jordan, T. H. Just, C. D. Killpack, C. Y. Laing, W. B. Laurence, M. W. Littlewood, A. V. McMaster, G. K. Maurice, R. D. Mody, C. E. Molino, G. J. P. Monod, R. Montgomery, A. E. Moore, G. Moore, H. C. W. Nuttall, C. E. H. Paley, G. N. Palmer, H. B. Parker, A. B. Pestonji, H. F. Renton, W. Reynolds, Q. H. Richardson, B. P. Sabawala, H. H. Sampson, A. R. P. Scott, W. F. V. Simpson, C. J. Stocker, M. P. Thomas, G. Y. Thomson, R. T. Timberg, H. S. Tumber, A. B. G. Underwood, W. R. Wade, P. B. Wallis, H. Wetherbee, E. V. Whitby, S. Williams.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

A MEETING of the members of the Faculty was held in their hall, St. Vincent Street, Glasgow, on November 7th, when the following office-bearers were appointed for the ensuing year: *President*, Mr. D. N. Knox; *Visitor*, Dr. James A. Adams; *Councillors*, the President (*ex officio*), the Visitor (*ex officio*), the Treasurer (*ex officio*), Mr. D. N. Knox (as Representative to the General Medical Council), Dr. John Barlow, Dr. J. Wallace Anderson, Dr. John Glaister, Dr. Alexander Napier, Dr. David Newman, Dr. A. Maitland Ramsay, Dr. George Halket; *Treasurer*, Dr. W. G. Dun; *Honorary Librarian*, Dr. Alexander Napier.

The Services.

PRIZES AT THE JUNIOR COURSE EXAMINATION.

IT is announced by the War Office that the prize winners and prizes gained at the second junior course examination for lieutenants of the Royal Army Medical Corps are as follow: Lieutenant W. W. Treves, M.B., 1st Montefiore, Parkes Memorial, Marshall Webb, and Herbert prizes; Lieutenant C. H. H. Harold, M.B., the Tulloch Memorial and Ronald Martin prizes; Lieutenant R. F. Bridges, M.B., the De Chaumont prize.

LABORATORY TRAINING FOR R.A.M.C. OFFICERS.

THE War Office has issued a circular letter regarding a proposal made by the Council of the Royal Institute of Public Health. The Council had written to the War Office to the effect that it might possibly aid the medical service of the army by placing the opportunities which it possesses in the laboratories of the Institute at the disposal of the War Office, and is willing to admit gratuitously two medical officers yearly to work in the laboratories for a period of six months each. In the bacteriological and chemical laboratories practical teaching is given to medical practitioners desirous of qualifying as medical officers of health, and that investigations are also undertaken into the purity of water supplies, quality of food samples, epidemics, and infectious disease, etc. The laboratories are also equipped for serological work. It is understood that this offer was intended to apply to medical officers of the regular army; but it is thought possible that the Council of the Institute, if asked to do so, might offer these facilities instead to Territorial medical officers. Inquiry is therefore made in the circular as to whether, in the event of such an offer being made, Territorial medical officers would avail themselves of it.

SCOTTISH TERRITORIAL RED CROSS BRIGADE.

PROGRESS is being made throughout Scotland with the formation of the voluntary aid detachments which are to be grouped under the organization known as the Scottish Territorial Red Cross Brigade, and meetings of the various county committees of the Red Cross Society have been held to push forward the work. Colonel J. G. A. Baird, of Coulstoun, formerly M.P. for the Central Division of Glasgow, presided at a meeting in Haddington on November 9th, to organize the work of the East Lothian detachments. The Marchioness of Bute and the Marchioness of Graham were present as President and Vice-President of the Bute County Committee at a public meeting in Rothesay in connexion with the Buteshire organization. The Duchess of Montrose presided on November 10th at a public meeting in Stirling, when Sir George Beatson, M.D., K.C.B., urged the claims of the Red Cross Society. On November 11th the Countess of Eglinton presided at a meeting of the Ayrshire Division in Ayr, when Major Fleming, M.B., D.S.O., explained the organization, and the Marquis of Ailsa and the Earl of Eglinton also addressed the meeting. Meetings were also held on November 11th at Ballinling, Perthshire, and at Dumbarton for the purpose of forming detachments in these districts.

Obituary.

THOMAS FRANCIS SPITTAL CAVERHILL,

M.B., C.M., F.R.C.P.E.,

EDINBURGH.

WE regret to announce the death of Dr. T. F. S. Caverhill, of 6, Manor Place, Edinburgh, which took place at his brother's house at Jedburgh on November 4th. He had been in failing health and unfit for the duties of practice since December, 1909, and it had been known to his friends that he could never return to active work, though it was not anticipated that his end was so near.

He was born at Crickshaw some fifty-five years ago, and was educated at the Parish School of Cranshaws, Berwickshire, and later at the Parish School of Duns. From the latter school he proceeded to the University of Edinburgh, where he graduated M.B., C.M. in 1878. Subsequently he studied at Vienna. In 1882 he was admitted a Member of the Royal College of Physicians of Edinburgh, becoming a Fellow in the following year. He was a resident physician and a resident surgeon in the Royal Infirmary of Edinburgh, as also in the Royal Maternity and Simpson Memorial Hospital, Edinburgh. He was senior Secretary and President of the Royal Medical Society. Later he was one of the physicians to the New Town Dispensary, and ophthalmic surgeon to the Eye Dispensary of Edinburgh. For many years he was Medical Officer for the County of Haddington. All his life he was greatly interested in the volunteer movement, and he was in the end Surgeon-Colonel of the Lothians and Berwickshire Imperial Yeomanry, and one of its most popular officers. He retired when the new Territorial scheme came into force. He was profoundly interested in the subject of tuberculosis, and was consulting physician to the Manor Valley Sanatorium, in the county of Peebles.

In 1898 he published in the JOURNAL an article on "The Open-air Treatment of Consumption," and in 1900 an article on "Removal and Transport of Cavalry Wounded." He was also the author of a pamphlet on "The Crusade against Consumption."

He was an extremely interesting and attractive man, and had a wide mental outlook. Few men since the death of Professor Veitch, of Glasgow University, knew so much of the history, legends, songs, and ballads of the Scottish borders. The writer will not soon forget a day he spent with him in visiting the Manor Valley Sanatorium, the Black Dwarf's Cottage, and other points of interest in Peebleshire. He talked incessantly and in the most interesting way.

Till his health began to fail he had a large and important practice among the better and upper classes in Edinburgh and its neighbourhood, who held him in high esteem. He was never married. The cause of his death was highly marked arterio-sclerosis.

In Dr. Caverhill Edinburgh loses a conspicuous figure.

The funeral took place on Tuesday, November 8th, at Innerwick Churchyard. There was a large gathering of friends from Edinburgh, East Lothian, and Berwickshire.

The service was conducted in the parish church of Innerwick by the minister of the parish (the Rev. Mr. Sutherland), and the Rev. Dr. Wallace Williamson, St. Giles's Cathedral, Edinburgh. The latter also officiated at the grave.

Medical women of England will hear with profound regret of the death of Violet Ackroyd-Turkhud, M.D., B.S.Lond., of enteric fever, in Bombay, at the age of 29. She was born in India and educated entirely in England. She was a student of Bedford College, London, and of the Royal Free Hospital School of Medicine for Women, where her cheeriness of disposition made her universally popular. She was a keen student and an enthusiastic worker in her profession. She qualified in 1906, taking the degree of M.B., B.S.Lond. After some post-graduate work in England she went out to India, where for some months she was on the staff of the Dufferin Hospital for Women, Delhi. She was next in charge of the Women's Hospital, Alwar. In 1909 she returned to England and took her degree of M.D.Lond. with honours in pathology. She also, after working for some months at the School of Tropical Medicine, Liverpool, obtained the diploma of Public Health. In February, 1910, she came back to India and started practice in Bombay. She was engaged in research work in pathology at the Canea Hospital, Bombay, for some months before her death, which occurred on October 18th. Her untimely death, at the beginning of what promised to be a most useful and distinguished career, is mourned by a wide circle of friends both in India and in England.

Deaths in the Profession Abroad.—Among the members of the medical profession in foreign countries who have recently died are Dr. Joseph Förster, Professor of Hygiene and Director of the Institute of Hygiene and Bacteriology in the University of Strassburg, aged 66; Dr. Frederick Holme Wiggin, Consulting Surgeon to the City Hospital, and Visiting Gynaecologist to St. Elizabeth's Hospital, New York, aged 57; Dr. Obdulio Hernandez, Professor of Surgical Pathology in the Medical Faculty of Buenos Aires; Dr. J. Chapplain, some time Professor of Surgery in the Medical School of Marseilles; and Dr. Trousseau, a distinguished Ophthalmologist of Paris, and Surgeon to the Quinze-Vingts Hospital, who was killed in a motor accident.

Public Health AND POOR LAW MEDICAL SERVICES.

LOCAL GOVERNMENT BOARD REPORTS.

Holywell Registration District (by Dr. E. P. Manby. New series, No. 29.).—The grounds of the inquiry were the slowness of progress in the constituent sanitary districts of the Holywell registration district in sanitary matters generally, and of continuance of complaints to the Local Government Board regarding the persistence of conditions prejudicial to the comfort and health of the inhabitants. The population of the registration district is approaching 50,000, and it includes the urban districts of Buckley, Connah's Quay, Mold, and Holywell, the borough of Flint, and the Holywell rural district. Detailed recommendations are made with regard to all these districts, but the most important and far-reaching is with respect to the appointment of a joint medical officer of health for the entire area, or in combination with the adjoining urban districts of Rhyl and Prestatyn, and the rural districts of Hawarden, Holywell, and St. Asaph. Dr. Manby states that the Local Government Board has had many years' experience of the working of combined whole-time medical officer of health appointments, and its experience shows that the advantages of such arrangements far outweigh the supposed disadvantages. In Dr. Manby's opinion the present is an age of specialization, and there is an obvious advantage to sanitary administration in employing a specially qualified trained medical officer of health giving his whole time to his duties, rather than a general practitioner untrained in sanitation and subject to conflicting interests. With the best intentions, the part-time medical officer of health, who receives as a rule only a small salary, tends to fall into one of two classes: he either does his official duty thoroughly, and thereby offends and perhaps loses valuable patients, and possibly in the end loses his appointment also; or he does little active public health work, or perhaps confines his activity to tendering good advice in his reports to his council. This advice the council may disregard, and naturally enough the medical officer of health does not then feel disposed to urge persistently and personally at the council measures known to be unpalatable to some of his best patients. The whole-time medical officer of health is independent of patients; he is, moreover, in virtue of his special training, of great assistance to the various inspectors of nuisances in his district, who recognize him as an authority, whereas they are apt to act independently of a part-time untrained medical officer.

APPOINTMENT OF ASSISTANT M.O.H.

Zeta.—The approval of the Local Government Board is not required for the appointment of an assistant medical officer of health who would act as deputy to the medical officer of health. There does not appear to be any statutory obligation that such an assistant should have a Diploma in Public Health, but it is quite open to any local council to require that the person appointed should be so qualified.

Medical News.

The late Sir Constantine Holman left estate valued at £19,293 gross, of which £18,423 is net personalty.

Dr. William Millar, Public Vaccinator of the Fourth (Welton) District of the Sculcoates Union, has received, for the fourth time in succession, the Government grant for efficient vaccination.

The Hon. Sir John A. Cockburn, M.D., K.C.M.G., Sir Malcolm Morris, K.C.V.O., Dr. J. W. Hope, P.M.O., Central Board of Health, Western Australia, and Dr. Charles, M.O.H., St. Marylebone, have been elected Fellows of the Royal Sanitary Institute.

At the meeting of the Royal Society on Thursday, November 24th, Sir W. Abney will read the second part of his paper on colour blindness in the trichromatic theory; in this he will deal with incomplete red or green blindness.

In 1904 there were in the United States 133 sanatoriums and hospitals for tuberculosis, 32 special dispensaries for its treatment, and 39 antituberculosis organizations. There are now over 400 such sanatoriums and hospitals, over 300 tuberculosis dispensaries, and 450 antituberculosis associations.

A public meeting in aid of the North Kensington Dispensary for the Prevention of Consumption will be held at the Kensington Town Hall on Wednesday, November 23rd, at 5.30 p.m. The chair will be taken by the Duke of Argyll, and among the speakers will be the Lord Chief Justice of England, Dr. Alfred Hillier, M.P., and Dr. Sutherland.

A new method of evading the United States law relative to the sale of opium is reported by the *Boston Medical and Surgical Journal* from Chicago, where the proprietor of a Chinese restaurant has recently been discovered purveying sandwiches containing the drug to *habitués* who had difficulty in obtaining it in the more usual form.

A large number of medical men are expected to be present at the Bristol Medical School annual dinner, to be held on November 29th at the Royal Hotel, College Green, to welcome Sir Alfred Keogh, K.C.B., the late Director-General, Army Medical Staff, who is to be the guest. Those requiring tickets (price 5s.) should apply to the Secretaries of the Dinner Committee at the Royal Infirmary.

The adjourned debate on fractures in the neighbourhood of the joints, opened on November 8th by Mr. Robert Jones before the Surgical Section of the Royal Society of Medicine, will be resumed at 15, Cavendish Square, on Tuesday, November 29th, at 5 p.m. Intending speakers, who are limited to ten minutes, are requested to send their names to Mr. Jonathan Hutchinson, 1, Park Crescent, W.

Letters, Notes, and Answers.

COMMUNICATIONS respecting Editorial matters should be addressed to the Editor, 429, Strand, London, W.C.; those concerning business matters, advertisements, non-delivery of the JOURNAL, etc., should be addressed to the Office, 429, Strand, London, W.C.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

ARTHRITIS writes: I am anxious to have some help in the treatment of a troublesome case of rheumatoid arthritis. A slight temperature is running, the right knee and right elbow being affected. The other joints have become practically normal under "sauerin treatment" combined with guaiacol carbonate. I have tried the hot-air baths with no benefit. I should be pleased if some reader would suggest any other line of treatment.

PLAGUE OF FLIES.

THERE seems to have been this year in many parts of England an unusual number of autumn flies which still survive in the warm rooms of the house, such as the dining-room and kitchen. A correspondent in the North of England, who has tried burning sulphur, formalin, carbolic acid and similar remedies without good results, asks for advice how to get rid of the flies.

BOTTLE FEEDING AND FLAT CHESTS.

DR. W. J. HENSON (Wedmore) writes: During the last few years, while devoting my spare time to the subject of infant feeding, I have been much struck, when examining candidates for life insurance, etc., with the fact that in *every instance* that I have been able to elicit the truth the deformed or flat-chested candidate has been bottle-fed as an infant. It seems to me the counteracting suction action on the immature chest wall, when the child is made to *suck* its food out of a bottle, is bound to draw in the ribs or sternum. When the child is breast-fed it obtains its food by compression and pulling as a cow is milked, with no suction action whatever, so that the infant is able to inflate its lungs whilst feeding, and thus suction muscles are not unduly developed. This undoubtedly accounts for the fact that babies fed in this proper manner have invariably more regular and beautiful features than when the more artificial method is encouraged. This applies to every type of feeding-bottle I know, more or less, except the "Amater," which Messrs. Lowe and Co., of 8, Stafford Street, Old Bond Street, W., had made at my suggestion, and which you noticed in your columns some months ago. I would like to ask those members who have a larger experience in examining for life insurance, etc., to kindly look out for and inquire into the question. I feel sure they would be much struck by the result of such inquiry.

ANSWERS.

DR. H. J. THORP (Ipswich) writes, in reply to "Hertford," to recommend the following ointment spread on lint: ℞ Ung. hyd. fort. ʒss, ex. bellad. ℈j, ung. sulph. ʒiij. M.

F. B.—The scientific name of the trypanosome in the blood of the freshwater eel *(Anguilla)* is *Trypanosoma granulosum*, Laveran and Mesnil, 1902. Two varieties, *magna* and *parva*, were distinguished by Lebailly in 1905. The most recent descriptions are by Lebailly (*Arch. de Parasitologie*, x, 1905), and Minchin (*Proc. Zool. Soc. Lond.*, 1908).

BOOKS FOR THE L.R.C.S.EDIN.

H. J. G. asks what books are required for the L.R.C.S.Edin. (single licence), especially in regard to the anatomy part of the examination.

*** The following works would probably meet our correspondent's requirements: *A Textbook of Anatomy*, By D. J. Cunningham, F.R.S. Third Edition. (London: H. Frowde and Hodder and Stoughton. 1909. 31s. 6d.) *Anatomy, Descriptive and Applied.* By H. Gray, F.R.S. Seventeenth Edition, edited by R. Howden, M.A., M.B., C.M. (London: Longmans, Green, and Co. 1909. 32s.) *A Manual of Surgery for Students and Practitioners.* By W. Rose, M.B., B.S.Lond., F.R.C.S., and A. Carless, M.S.Lond., F.R.C.S. Seventh Edition, *University Series.* (London: Baillière, Tindall, and Cox. 1908. 21s.) *The Practice of Surgery.* By W. G. Spencer, M.S., M.B.Lond., F.R.C.S.Eng., and G. E. Gask, F.R.C.S. (London: J. and A. Churchill. 1910. 22s.) *Manual of Surgery.* By A. Thomson, F.R.C.S.Edin., and A. Miles, F.R.C.S.Ed. *Oxford Medical Publications.* In two volumes. Volume I, General Surgery; Volume II, Regional Surgery. Second Edition. (Edinburgh, Glasgow, and London: H. Frowde and Hodder and Stoughton. 1909. 10s. 6d. each volume.)

COLLOIDS.

DR. H. OPPENHEIMER (London) writes: "D.G.D." will find an account, by Dr. Max Joseph, of colloids, including colloidal calomel, in *Dermatologisches Zentralblatt*, vol. x.

AUSTRALIA FOR ASTHMATIC PATIENTS.

F. A. writes: In reply to "L. I. C." (BRITISH MEDICAL JOURNAL, November 5th, p. 1480), I resided in Melbourne, Australia, for some years, and remember the case of an old gentleman, a sufferer from asthma, which may be of use. He was compelled to leave Melbourne and live in Ballarat, an elevated country town. While there he was quite free from his complaint, but staying only a single night in Melbourne invariably brought on a recurrence. Melbourne is only a few miles from the sea.

LETTERS, NOTES, ETC.

ERRATA.—In the article by Drs. D. A. Welsh and H. G. Chapman "On the Interpretation of the Precipitin Reaction," in the JOURNAL of November 12th, p. 1511, col. 1, line 11 from foot, for "precipitate substance" read "precipitable substance"; col. 2, Table I, under "Volume of Antiserum," No. 7, for "3.0" read "5.0," No. 8, for "3.0" read "5 0."

PRINCE ALEXANDER OF TECK has graciously consented to accept the proceeds from the sale of *Lusus*, a book of verse and prose, by Mr. Christopher Stone, on behalf of the Prince Francis of Teck Memorial Fund for the endowment of the Middlesex Hospital. Copies, price 5s. each (postage 4d. extra), may be obtained from Mrs. Christopher Stone, 177, St. James's Court, Buckingham Gate; from Mr. B. H. Blackwell, the publisher, 51, Broad Street, Oxford; or from Messrs. J. and E. Bumpus, Messrs. Truslove and Hanson, and Messrs. Hatchards, who have kindly undertaken to sell copies for the fund.

THE AUTOFUME.

WE have recently had an opportunity of examining a new appliance named the "autofume." The object of its construction has been to provide a machine which will burn definite amounts of medicated paper at definite intervals, such amounts and intervals to be variable at will, the consumption being automatic and entirely freed from risk of fire. The final object, of course, is to furnish a method of prolonged fume production for the benefit of persons suffering from asthma, hay fever, and other conditions in which an atmosphere containing special constituents is deemed of value. The mechanism of the appliance is simple, but not easy to describe. We must therefore content ourselves with saying that at given intervals a strip of medicated paper is extruded into the flame of a night-light. Two wheels are supplied with the machine, and each can be geared to work at two speeds. Thus wheel A secures the consumption of 12 inches of medicated paper either every 20 minutes or every 40 minutes as desired. Wheel B effects the consumption of 8 inches of paper every 30 minutes or every 60 minutes. The machine goes on doing its work automatically as long as the night-light lasts. Both from a mechanical and therapeutic point of view the appliance seems to us excellent. It is made by Messrs. Arnold, of West Smithfield, E.C.

EVENING OPENING OF MEDICAL LIBRARIES.

DR. E. G. L. GOFFE (Tottenham) writes: It seems a pity that there should be, in London, practically no facilities for reading or for research work in a medical library after 7 p.m. The reading room of the British Museum is open up to 10 p.m. at night, and many other public libraries offer the same facilities to the general reader. Why should not the College of Surgeons keep the library open until 10 p.m.? This would be a great convenience to many who have only the evenings free to look up references or to read up a subject.

EARLY SYMPTOM OF PLAGUE.

DR. JOHN C. THOROWGOOD (Bognor) writes: I observe that Dr. H. P. Sleigh reports how all his patients smitten with plague complained of severe frontal headache as an early symptom. This fact reminds me of the late Sir George Buchanan telling me how, when as resident medical officer at the London Fever Hospital, he was attacked by typhus fever, his most striking symptom was intense frontal headache. Not perhaps a very rare initiatory symptom in the advent of fever, but still it shows the affinity that may exist between genuine typhus and plague.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

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NOTE.—It is against the rules of the Post Office to receive *postes Restante* letters addressed either in initials or numbers.